

Scanning - Shortwave - Ham Radio
Equipment - Computers



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Monitoring Times

Volume 24, No. 6
June 2005

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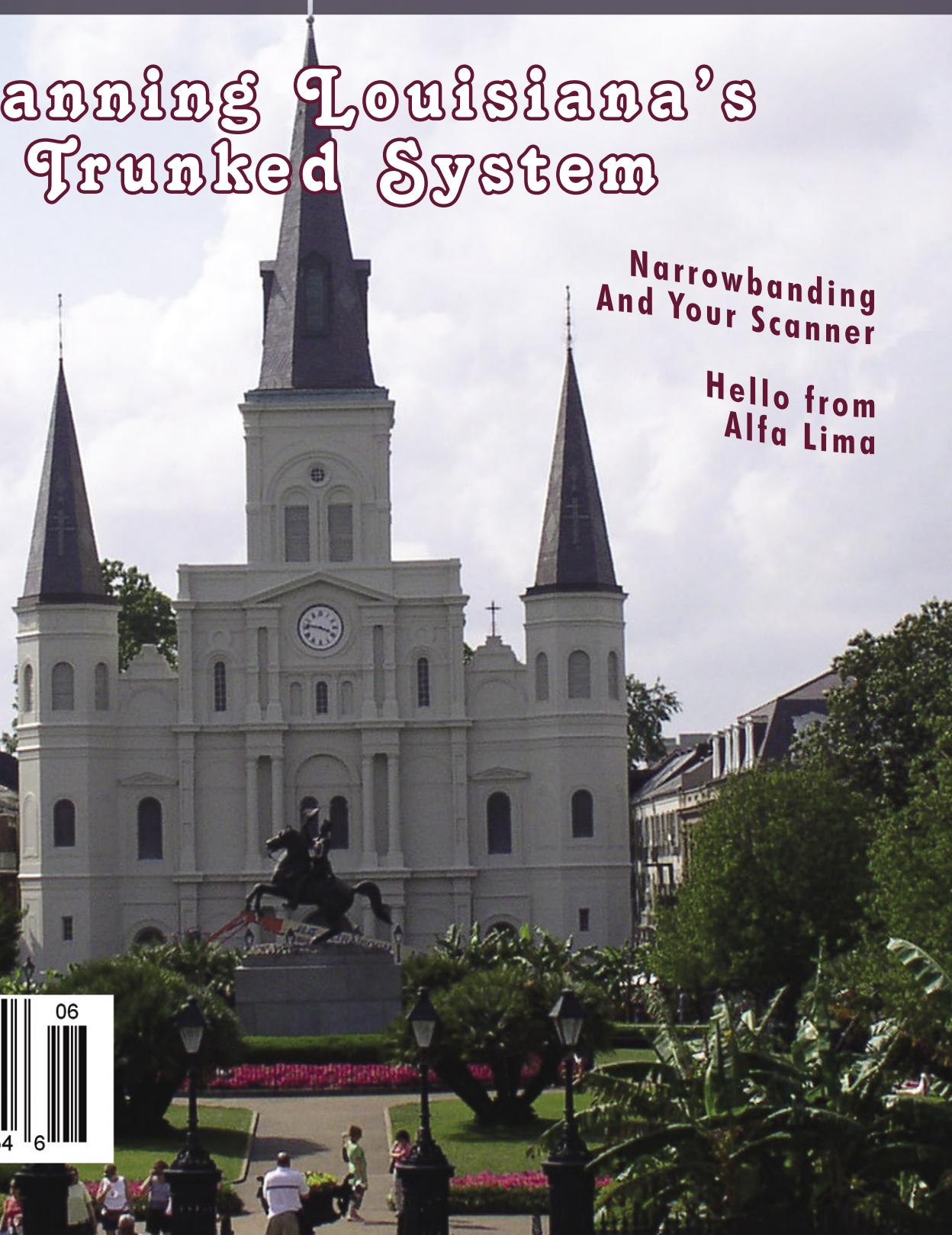
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Scanning Louisiana's Trunked System

MT Reviews:
PRO-2096
Eton E10
Flex Radio
SDR-1000
Nightlogger II
ZAP 270

**Narrowbanding
And Your Scanner**

**Hello from
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SR2000

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AC adapter, control cables



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Vol. 24, No. 6

June 2005



Cover Story

Louisiana's Trunked Radio System

By John Mayson

As the gateway to the Mississippi, Louisiana was important to US interests even before its purchase in 1803. Today, scanner listeners have virtually statewide access through the Motorola Type II Smartzone system which links public safety agencies throughout Louisiana.

MT presents a parish-by-parish look at major agencies and talk-groups for control-channel scanning of Louisiana's Trunked Radio System.

On our cover: Jackson Square, a popular New Orleans tourist destination. Photo by Gayle Van Horn.

Narrowbanding and Your Scanner 14

By David Stark

"My scanner can't display all those digits. Will I still be able to hear the conversations?" "Should I buy a new scanner now or wait until a narrowband scanner comes out?" "My scanner already has FM-Narrow mode, so what's the big deal?"

To conserve spectrum, the FCC has cut the VHF/UHF bandwidths in half, and these new channels are now beginning to show activity. However, scanner production has not kept pace with the new channel assignments. Does this mean your scanner is obsolete? Not necessarily. Here's some background on the new bandplans and how they will affect your listening.

Birth of a Station 16

By Todd Van Gelder

In an age when change proceeds at a dizzying pace, it's nice to know that good old AM is still the workhorse when it comes to getting out information. At the National Institutes of Health, progress meant constantly-changing traffic patterns, confusion, and frustration. Travelers Information Station KFQ-70 came to the rescue.

Hello from Alfa Lima International 17

By Alfred E. Zoer

This European pirate provides a brief introduction to his well-known unlicensed shortwave station and the pirate scene in general.

On Writing Club Newsletters 18

By Arthur R. Lee

Don't think you have any skill or material to contribute to your group's publication? Think again! Arthur Lee shows how simple it can be, how beneficial it can be to your club, and how much fun you can have doing it!

Reviews:

Our First Look at Radio Shack's new portable Pro-2096 scanner shows it to be a worthy performer, easy to program, and loaded with features. With a few exceptions, it can be recommended for most scanning applications (page 70).

The versatile Eton E10 covers AM, FM and shortwave in a lightweight, compact radio, perfect for travel or office use. Check out this affordable digital on page 69.

To all those who recommended John Catalano take another look at the Flex Radio SDR-1000 using a recommended sound card,

you can now say, "I told you so!" (See p.72)

The Nightlogger II should be subtitled the "Hobbyist's Friend." This handy gadget will control your tape recorder for long duration, unattended monitoring to catch those elusive signals in any part of the spectrum.

An RF meter has many uses, including locating bugs, measuring RF fields around electronic devices, locating sources of interference, and more. The new ZAP 270 shows increased sensitivity to higher-frequency signals and can be used with a directional antenna to pinpoint signal sources (page 68).



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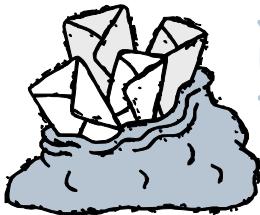
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LETTERS TO THE EDITOR

Trains and Transportation

"You said you'd like to know how the new feature *Boats, Planes and Trains* was being received. I quite enjoy reading these articles. Monitoring boats, planes and trains is a great pastime, and this column is terrific. I especially liked the issue in which Ron Walsh gave both HF and VHF maritime radio frequencies. Please keep this feature coming. Thanks."

— Chris Boyd

"Love the PDF version. I don't have to ransack the house for my back issues anymore."

"I was also very pleased to see the return of a transportation column. There are many utility fans that aren't hams or police groupies; at least I hope there are."

"Glad you sent Mr. Sturm my compliments; he wrote a review of the Relm HS-100 scanner for his website, said it was very good on the rail bands, so I bought one (the Racing Electronics RE2000 version) back in '99 or so — and sure enough, it was one of the best scanners I've ever owned, perhaps the best. I'm considering the purchase of another one."

— mu 23 [mu23@msn.com] <http://www.mdrails.com>

"Bob, just thought I would drop a note to you and let you know how valuable the AOR AR8200 Mark III was to use this past week. We use a Remote Control System for operating Locomotives in some of our yards in the 450 MHz range. The system at Hamlet, NC, was having problems dropping off line after midnights. Using a Spectrum Analyzer we were able to determine that it was an interference problem, which we were able to locate from a vehicle using an AR8200 Mark III and a directional antenna."

"It was a frustrating problem due to the intermittent nature of the trouble, but the 8200 made tuning and finding the offender a piece of cake when it was on the air. We installed a directional antenna and were able to restore service while we search for a clear channel to use. The search is being done using this same receiver and ScanCat Gold SE to scan and log hits on the channels available in this range."

— Dave Fouchey, Manager Communications, CSX Transportation

It's good hear from a few of you regarding the transportation column, now in its second year. I'm glad to know you like it, because the writers love what they do!

— Rachel Baughn

In Sympathy

We extend our sympathy to the family of Azizul Alam Al-Amin of Bangladesh, who wrote the guest editorial for this column in April

("Preserve Analog Shortwave Broadcasting"). He wrote, "I am very much shocked that on 28 March my uncle Md. Ataur Rahman Al-Amin died by heart-attack. He was the father of 4 year old Turjo (shown in the photograph here and in the April article). I really miss him because he was always encouraged and advised me especially in radio listening."



Thanks Back Atcha

Ken Windyka posted the following letter on a yahoo newsgroup after we posted the "annual airshow guide" to the *MT* website. Thanks, Ken, for the support and encouragement, especially in posting this "sales pitch" to other hobbyists.

"Thank you very much *Monitoring Times* magazine and Larry Van Horn, *Milcom* columnist.

"I think that most hobbyists on this list would agree that *MT* provides many 'free' services as well as *MT* monthly articles which contain 'factual' information that can readily be put to use by the monitoring hobbyist to more fully enjoy the milcom aspect of the hobby!"

"It's especially noteworthy that a current edition article would be posted for free on the web page for all to download, rather than just doing a first paragraph summary to hook folks into buying the magazine — You don't see that from any other (commercial) hobby publication!"

"Additionally, I think that everyone should give serious consideration to subscribing to *Monitoring Times* magazine. It's well worth the money spent!"

"I also know that Larry has worked very diligently in producing quality reference publications over the years, such as *Military Frequency Directory* 2nd edition, *Federal Frequency Directory*, 2nd edition, and *Grove Shortwave Directory*, 9th edition. These publications also IMHO greatly aid the milcom hobbyist and are both an efficient and cost effective way of having information readily available."

"Bob Grove, Larry Van Horn, *Monitoring Times*, Grove Enterprises, et al, over the years

have ALWAYS supported the monitoring hobby with loads of free information."

Thanks again — Ken Windyka

Correction

The wrong web site was given for Bruce Elving's FM Atlas in the April feature on "The Changing World of FM DX." The website is <http://members.aol.com/fmdxer> Thanks to Ken Reitz and Judy May for calling it to our attention.

Listening Post Pin-up

"I recently rearranged my listening post, so that it would be more convenient for me to operate. In order to stack all of my equipment so that I could control each piece without having to move my left arm too far beyond what I am capable, I purchased a Fellowes keyboard/monitor riser which included a pullout keyboard tray. The dimensions of this product were ideal, given the sizes of the equipment I am using and the deck space I wanted to allot to this function. I use a Kenwood R-5000 receiver, a Realistic PRO-2005 scanner, a Radio Shack tape recorder and external speaker. The height of the riser was not too high, which was a plus for me."

"Since I didn't need the keyboard tray, I removed it, leaving me with the riser section that has space underneath for the scanner and tape recorder, and adequate room on top for the shortwave receiver and speakers. I am using a Sony AN1 active antenna placed on the window sill of my ninth floor apartment, so reception is fairly good with electrical noise only periodically a problem."

— Brian Limbach, Pittsburgh, PA



We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, 7540 Highway 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com. Letters may be edited for length and clarity.

Happy monitoring!

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SCANNING

New Development in Michigan

Law-abiding citizens in Michigan will no longer need permission to have radio scanners in their vehicles if legislation introduced by state Rep. Kevin Elsenheimer becomes law.

House Bill 4544 eliminates the requirement for an amateur radio operator license or permit from the state police to carry equipment that receives assigned public safety frequencies.

"The current law is a well-intended effort to keep criminals from hearing what the police are doing," said Elsenheimer, R-Bellaire. "The reality is that anyone with criminal activity in mind will not ask for a permit, so only law-abiding residents are going through the paperwork and red tape. We need to ensure the bad guys are punished, not make it difficult for people with a hobby."

The bill eliminates the requirement for individuals to acquire a permit from state police and simply makes using a radio scanner for purposes of committing a crime illegal, punishable by a \$1,000 fine and one year in jail, the same penalty currently for not having a license or permit for the radio.

The House Judiciary Committee is reviewing the legislation. If you are a Michigan resident, contact your representative and encourage him or her to support this enlightened bill.

AVIATION

Flight Service Stations

On October 1, 2005, management of the Federal Aviation Administration's Flight Service Stations will be turned over to Lockheed Martin, which won a 5-year contract (plus 5-yr option) to modernize and maintain this critical aviation support system. The FAA expects to see a savings of \$2.2 billion over 10 years under Lockheed's proposed management plan.

Over the next two years Lockheed plans to close 38 of the current 58 service stations and reduce personnel by several hundred. Some service staff may be able to remain with the FAA by helping to fill an urgent need for flight controllers, some will be offered a retirement package with federal benefits, and others will transition to Lockheed, thereby losing their federal pension and benefits.

The move is being contested by the National Association of Air Traffic Specialists (NAATS). Skeptics questioned whether the motivation for the timing of the contract offer was the large number of employees who would soon be drawing pensions they will now lose, but the FAA says the timing is coincidental and the system was simply becoming too outdated and costly.

Lockheed plans an automated flight service network which must meet some stringent

requirements, such as acknowledging radio calls within 5 seconds, delivering requested information or filing urgent weather reports within 15 seconds, and posting flight plans within three minutes of filing.

Coincidentally, Lockheed Martin awarded a 10-year contract to SES Americom to support the space-based navigation services of the Federal Aviation Administration (FAA). This service will support communications in the FAA's Wide Area Augmentation System (WAAS) and allow broadcasting of navigation messages 24-hours a day, seven days a week.

BROADCASTING

Schools Win

Remember the attempt to grab school stations we reported on in January? The FCC rejected six attempts by Marty Hensley, the director of Hoosier Public Radio Corp., to force several educational radio stations to share their airtime.

In March, the Federal Communications Commission granted license renewals this month to six of the eight stations targeted by Hensley and rejected his petitions to force those stations to share airtime with his nonprofit company.

Taliban Clandestine Radio

Accusing available world media and local start-up broadcasters as all being too pro-American, Afghanistan's Taliban guerrillas launched a clandestine radio station in mid-April, broadcasting anti-government commentaries and Islamic hymns from a mobile transmitter.

Called "Shariat Shagh," or Voice of Shariat, after the station the Taliban ran while in power, the broadcast is heard in the five southern provinces, the former regime's old power base, between six and seven o'clock mornings and evenings.

Taliban attacks have picked up since the winter, but have not reached previous levels. The dip in activity plus this new clandestine broadcast fuel speculation that the movement may be struggling to find recruits and resources. However, desperate is still dangerous, warns commander of U.S. forces in Afghanistan, Lieutenant-General David Barno.

Attacks in Colombia

While opposition groups may set up clandestine stations to promote their causes, they may also attempt to disrupt the flow of information from government and other licensed broadcasters.

An Organization of American States (OAS) official, Eduardo Bertoni, expressed concern about recent attacks against legitimate broadcasters in Colombia. Armed men planted explosives near the transmission towers for radio stations Cristalina Estéreo and Espléndida Estéreo, located near the city of Florencia in the Colombian department (province) of Caquetá.

In February the antenna for radio station Latina Estéreo in the southern Colombian town of Puerto Asís was destroyed by various unidentified individuals, who planted explosives to burn down the transmission station as well.

Also in February, a car bomb destroyed the radio and television studios of station RCN in the city of Cali. The illegal insurgent group known as the Revolutionary Armed Forces of Colombia (FARC) claimed responsibility for that attack, said the OAS official. He also reported that the transmission station of two television channels in Putumayo was destroyed in early March by several heavily armed men, who spread gasoline and set fire to the interior of the building.

Bertoni pointed to a public commitment made by heads of state to the principle that countries in the region will ensure that "journalists and opinion-leaders are free to investigate and publish without reprisals."

Radio the Real Cause of Skin Cancer?

A scientific paper disputes findings that the sun is the cause of the rise of malignant melanoma in Sweden, Norway, Denmark and the USA. Instead, the authors claim, "we found a strong association between the introduction of FM radio broadcasting at full-body resonant frequencies and increasing melanoma incidence."

Their analysis of data indicates a correlation between the rollout of FM/TV broadcasting networks and increased melanoma cases beginning in 1955, whereas large-scale travel to sunny locations for the winter began seven years later.

"Conclusions: The increased incidence and mortality of melanoma of skin cannot solely be explained by increased exposure to UV-radiation from the sun. We conclude that continuous disturbance of cell repair mechanisms by body-resonant electromagnetic fields seems to amplify the carcinogenic effects resulting from cell damage caused e.g. by UV-radiation."

Read it for yourself at http://www.medscimonit.com/pub/vol_10/no_7/4321.pdf

New Morse Station

The Maritime Radio Historical Society (MRHS) was formed in 1999 with the aim of restoring ex-RCA coast station KPH to op-



RCA "K" set being tuned by Tom Horsfall

erational status. After a year of discussion and planning, the MRHS submitted an application to the FCC for a new class 1A common carrier public coast station. Even though all the provisions for licensing a station of this type were still in the rules, it was uncertain whether the license would be granted since no such license had been issued by the FCC for many years. But the license was duly issued, with the call sign KSM.

See more on this historic station in this month's *Utility World*, and at <http://www.radiomarine.org>

CITIZENS BAND

CB to the Rescue in Iraq

Hometown supporters of the 1544th Transportation Company of the Illinois Army National Guard have raised about \$10,000 to buy radios and Global Positioning System receivers since the unit deployed to Iraq last spring.

Friends, family members and Paris, Illinois, area businesses decided to buy 90 citizens band (CB) radios for the local unit's soldiers because the unit had only about 13 Army-furnished Single-Channel Ground and Airborne Radio System (Singcars) radios when it deployed to share between 63 vehicles.

The CB radios now allow all the vehicles in a convoy to communicate with one another when they trigger a mine or the roadside bombs. Robert Sinclair, a former member of the 1544th, says that with five people killed and more than 20 wounded, he is convinced the CB radios have saved lives by giving the soldiers a means to quickly call for help.

He says the soldiers of the 1544th exercise strict communication discipline with the nonmilitary radios, using the CBs only if they have been attacked or have struck a bomb. "At that point, the enemy already knows where you are," he added.

Besides the CB radios, Sinclair said supporters of the 1544th also bought 10 Rino 120 GPS receivers from Garmin. The Rino 120s also have built-in two-way radios, but Sinclair said members of the 1544th primarily use the devices as GPS receivers.

Col. Al Woodhouse, director of current operations in the Army's Office of the Chief Information Officer, said Army officials planned to ship more than 40,000 radios to troops in Iraq by April 2005 to make up for a shortage that has forced active, National Guard and Reserve units to buy their own equipment.

HI-TECH

Force Field Wireless makes products that it says can dramatically reduce the leakage of wireless signals from (or into) a room or building. DefendAir Radio Shield latex paint contains copper filings and an aluminum compound. When spread evenly on a wall, the

paint reflects signals in frequencies from 100 MHz to 5 GHz. Paint four walls, a floor, and a ceiling, and you effectively have a Faraday cage, which is a specially constructed metal room that blocks all radio signals in or out.

Besides the paint, Force Field sells 32 ounces of a copper/aluminum powder that homeowners can add to their own paint for \$34. The company also makes a window film that cuts down on signal leakage: A 30-inch-by-25-foot roll is priced at \$45.

There are drawbacks to the paint. Not only does it block interference from other wireless systems, it also blocks over-the-air television and mobile-phone signals.

Convincing consumers to take wireless security seriously has been harder than convincing businesses. "They see it like tinfoil on your head," cofounder Harold Wray says. "They think it's kind of paranoid."

Communications is compiled by Rachel Baughn (editor@monitoringtimes.com) from news stories submitted by our readers. Many thanks to this month's fine reporters: Anon, Md Azizul Alam Al-Amin, Mark Bajek, John Mayson, Jerry None, Michael Reynolds, Doug Robertson, Brian Rogers, Robert Thomas, Larry Van Horn, and Ed Yeary.



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is fast and
furious or the
safety of
thousands
may depend
on how well
your team
monitors the
action at a
public event,
you need the
flexibility and
durability built
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State of Louisiana Trunked Radio System

By John Mayson

In the year 1802, President Thomas Jefferson wanted to purchase the city of New Orleans since it controlled the mouth of the Mississippi River. The river was important for shipping goods to and from parts of the country west of the Appalachian Mountains. The United States had a treaty with Spain allowing access to the Port of New Orleans. However, Napoléon Bonaparte had restored Louisiana to French control and the Americans feared the loss of access to the city's ports.

President Jefferson sent James Monroe and Robert R. Livingston to Paris to negotiate the purchase of New Orleans and the land east of the city. The American negotiators were prepared to spend \$2 million for the purchase, but were stunned to learn that Bonaparte was willing to sell all of the French land between the Mississippi River and Rocky Mountains for \$22.5 million or a mere three cents per acre.

The United States and France signed the Louisiana Purchase Treaty on April 30, 1803, which Congress ratified on October 20 of the same year. The purchase doubled the size of the United States and the funds paid to France helped Napoléon build an army that would defeat Austria, Prussia, and Russia and make him the master of most of Europe.

France turned New Orleans over to the United States on December 20, 1803. Dignitaries from both nations were present. It would have been a wonderful scanning event, except that the radio had not yet been invented. In fact, Marconi had not yet been born.

Fortunately, scanner owners today have the opportunity to monitor a statewide trunked radio system in the great state of Louisiana.

Louisiana used a mix of low-band, VHF, and UHF frequencies before their trunked system came online in 1987. Originally only the Louisiana State Police used the system, but, over time, many local, state, and federal agencies have joined the system. The Louisiana TRS is a Motorola Type II Smartzone system and allows users to communicate from anywhere in the state. Scanner listeners in Louisiana have heard sheriff's offices from 100 miles away on their local repeater.

Louisiana is divided into parishes in the same way that other states are divided into counties. Colonial Louisiana was officially Roman Catholic and both the Spanish and French rulers

applied ecclesiastical governing units. Many of the parish names retain the previous church parish names.

Frequencies

Louisiana is a mid-sized state which requires forty-six towers encompassing hundreds of frequencies (see Table 1). It's impractical to fill up a scanner with nothing but the state's trunked radio system. A tip I give to folks monitoring wide-area Motorola trunked systems is to program only the control channels and set the bank to "control channel only" mode. I use this method while traveling both I-10 and I-20 and it works great (see Table 2).

The system also supports the nationwide I-TAC frequencies plus a State Police talkaround channel (TAC) (see Table 3).

Users

A number of local, state, and federal agencies use Louisiana's trunked radio system. We'll only concentrate on the "action" talkgroups. A complete list of talkgroups can be found in *Police Call* or online at <http://www.radioreference.com> and bellsouthpwp.net/k/d/kd5eis/.

Louisiana State Police

The primary user of the state's trunked radio system is the Louisiana State Police (LSP). The LSP has its roots in the Louisiana Highway Commission. In 1922 Louisiana saw its first attempt at law enforcement at the state level. The state had 2,700 miles of road and over 100,000 vehicles. The Highway Commission created a team of 16 men who patrolled the state's highways on motorcycles. During the two-year period between 1922 and 1924 they reported 114 serious accidents and 18,918 traffic violations.

The 1928 the force had grown to seventy uniformed officers and the state was divided into three administrative districts. They gained additional law enforcement duties including the Bureau of Criminal Investigation that dealt with non-traffic related crimes and in 1932 they were authorized to carry firearms.

In 1936 the state legislature passed a bill creating the Department of State Police. General Louis F. Guerre, whose surname translates to "war," modeled his newly created department

after J. Edgar Hoover's famous "G-Men." The LSP was divided into eleven districts with a total of 146 patrol officers. Six years later the legislature abolished the Department of State Police and created the Department of Public Safety. Prior to 1946 Louisiana did not require driver's licenses, but issuing them became yet another duty of the State Police.

The State Police took on yet another role in the mid-1990s when the legislature approved gambling. The Louisiana Gaming Control Board (LGCB) falls under the State Police. Each troop has a LGCB talkgroup.

Today the LSP has 1,022 men and women responsible for all elements of criminal and highway safety interdiction in the state. They have a distinguished record of keeping Louisiana's highways safe, assisting during hurricanes and floods, and protecting civil rights protestors during the turbulent 1960s.

The LSP is divided into two regions and nine troops (see figure 1). Region I is headquartered in Baton Rouge and encompasses troops A, B, C, and L. Region III is headquartered in Alexandria and encompasses troops D, E, F, G, and I. There is no Region II.

LSP Statewide Talkgroups

These talkgroups are common to all nine troops and may be heard across the state.

Talkgroup	Description
5776	Headquarters
6576	Task Force 1
6608	Task Force 2
6640	Task Force 3
6672	Task Force 4
6704	Task Force 5
6736	Task Force 6
6768	Task Force 7
6800	F1



7056	F2
7088	TAC 1
7120	TAC 2
7152	TAC 3
7184	TAC 4

LSP Troop A Talkgroups

Troop A is headquartered in Baton Rouge and led by Capt. Aaron Chabaud. Troop A includes the following parishes: Ascension, East Baton Rouge, East Feliciana, Iberville, Livingston, Pointe Coupe, West Baton Rouge, and West Feliciana. It includes the state capital of Baton Rouge.

LSP Troop D Talkgroups

Troop D is headquartered in Lake Charles and led by Capt. Russell Haman. Troop D includes the following parishes: Allen, Beauregard, Calcasieu, Cameron, Jeff Davis.

2256	LSP-1
2288	LSP-2
2320	Coordinate Call
2352	Coord/Talk-1
2384	Coord/Talk-2
2448	Safety Enforcement
2480	State Fire Marshals

Talkgroup	Description
1936	F1 Dispatch
1968	F2
2064	Car to Car
2096	Gaming (LGCB)
2128	Narcotics
2160	Criminal Investigations
2192	Executive Security
2224	Department of Public Safety

Talkgroup

Talkgroup	Description
16	F1 Dispatch
48	F2
144	Car to Car
176	Gaming
208	Narcotics
240	Criminal Investigations
272	Executive Security
304	Department of Public Safety
336	LSP-1
368	LSP-2
400	Coordinate Call
432	Coord/Talk-1
464	Coord/Talk-2
496	Emergency
528	Safety Enforcement
560	State Fire Marshals

LSP Troop B Talkgroups

Troop B is headquartered in Kenner and led by Capt. Brian Etland. Troop B includes the following parishes: Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, and St. John. It includes the metropolitan New Orleans area.

Talkgroup	Description
656	F1 Dispatch
688	F2
784	Car to Car
816	Gaming (LGCB)
848	Narcotics
880	Criminal Investigations
912	Executive Security
944	Department of Public Safety
976	LSP-1
1008	LSP-2
1040	Coordinate Call
1072	Coord/Talk-1
1104	Coord/Talk-2
1168	Safety Enforcement
1200	State Fire Marshals

LSP Troop C Talkgroups

Troop C is headquartered in Gray and led by Capt. Val Penouilh. Troop C includes the following parishes: Assumption, Lafourche, St. James, and Terrebonne.

Talkgroup	Description
1296	F1 Dispatch
1328	F2
1424	Car to Car
1456	Gaming (LGCB)
1488	Narcotics
1520	Criminal Investigations
1552	Executive Security
1584	Department of Public Safety
1616	LSP-1
1648	LSP-2
1680	Coordinate Call
1712	Coord/Talk-1
1744	Coord/Talk-2
1808	Safety Enforcement
1840	State Fire Marshals

Table 1. Louisiana TRS frequencies

City	Parish	Frequencies
Abbeville	Vermilion	852.6625, 853.1375, 853.5875, 854.0875, 855.0125, 855.9875*
Alexandria	Rapides	851.6875, 852.6625, 853.6125, 854.5625, 855.5125, 867.3625, 867.8875, 868.4375*
Angola	West Feliciana	856.7625, 857.7625, 858.7625, 859.7625*
Baton Rouge	East Baton Rouge	856.2375, 856.4625, 858.2375*, 859.2375*, 866.2250, 866.5375, 866.9500, 867.6125, 868.0250, 868.4875, 868.7375, 868.9875
Bellevue	Bossier	857.2625, 858.2625, 859.2625, 860.2625*
Bernice	Union	854.9125, 855.8625, 858.2625, 860.2625*
Berwick	St. Mary	857.9875, 858.9875, 859.4375, 859.9875, 860.9875*, 867.1875, 868.0500
Bridge City	Jefferson	852.1875, 854.0875, 855.0125, 857.7625, 858.7625, 859.7625*, 860.7625*, 867.2625
Buras	Plaquemines	856.2375, 858.2375, 859.2375*, 860.4625
Calhoun	Ouachita	855.9875, 856.9625, 857.9625, 858.9625, 859.9625*
Columbia	Caldwell	854.9875, 856.2125, 857.2125, 860.4875*
Covington	St. Tammany	866.2625, 866.5375, 866.7875, 867.0625, 867.3125*, 868.4250
DeQuincy	Calcasieu	856.4625, 856.7625, 857.4625, 858.4625*
Ferriday	Concordia	866.2625, 866.6750, 868.4125, 868.9125*
Geismar	Ascension	851.5625, 852.0625, 853.0125, 853.9625, 854.4375, 854.9125, 855.8875*
Goudeau	Avoyelles	856.9875, 857.9875, 858.9875, 859.9875*
Gray	Terrebonne	857.4625, 858.4625, 859.4625, 860.4625, 860.9625*
Greensburg	St. Helena	856.4375, 857.4375, 858.4375, 859.4375, 860.4375*
Hackberry	Cameron	857.9625, 858.9625, 859.4625, 859.9625, 860.9625*
Hammond	Tangipahoa	866.1750, 866.7500, 867.2750, 867.8250*, 868.2000, 868.9375
Homer	Claiborne	857.4375, 858.4375, 859.4375, 860.9625*
Jackson	East Feliciana	852.1875, 853.1375, 854.0875, 855.0125, 855.9875*
Jeanerette	Iberia	866.3625, 867.1625, 867.8375, 868.4375, 868.9375*
Jena	La Salle	856.4625, 857.7625, 858.4625, 860.7625*
Jonesboro	Jackson	857.2375, 858.2375, 859.2375, 860.2375*
Lake Charles	Calcasieu	866.1875, 867.2125, 867.7625, 868.2625, 868.8875*
Laplace	St. John	866.0625, 866.6625, 867.1875, 867.7125*, 868.0500, 868.7875*
Larose	Lafourche	856.9625, 857.9625, 858.9625, 859.9625*, 867.8625, 868.5750
Leesville	Vernon	855.4625, 855.9875, 856.4625, 860.4625*
Mansfield	De Soto	856.9875, 857.9875, 858.9875, 859.9875*
Many	Sabine	857.9625, 858.9625, 859.9625, 860.9625*
Marion	Union	856.7375, 857.7375, 858.7375, 859.7375, 860.7375*
Oak Grove	West Carroll	856.2375, 857.4625, 858.4625*, 860.7125
Oakdale	Allen	866.1000, 866.7250, 867.7250, 868.3750*, 868.9125
Plain Dealing	Bossier	856.9625, 857.9625, 858.9625, 859.9625*
Ramah	Iberville	866.3750, 866.5625, 866.9125, 867.8125, 868.3625, 868.8625*
Ringgold	Bienville	856.7625, 857.7625, 858.7625, 859.7625, 860.7625*
Rockefeller	Cameron	856.7125, 857.7125, 858.7125, 859.7125, 860.7125*
Rosepine	Vernon	856.2375, 857.2375, 858.2375, 859.2375*
Sheridan	Washington	856.9625, 857.9625, 858.9625, 859.9625*
Shreveport	Caddo	856.4625, 858.4625, 859.4625, 860.4625*, 866.3875
Slidell	St. Tammany	857.4625, 858.4625, 859.4625*, 867.1625, 867.6125, 868.0375, 868.0500
Sunset	St. Landry	852.1875, 856.4375, 857.4375, 858.4375, 860.2375*, 860.4375
Tallulah	Madison	857.2375, 858.2375, 859.2375, 859.4375, 860.2375*
Wheeling	Winn	857.4375, 858.4375, 859.4375, 860.4375*
Woodlawn	Assumption	854.9875, 857.7625, 858.7625, 859.7625, 860.7625*

Asterisks (*) indicate control channels



Talkgroup	Description
2576	F1 Dispatch
2608	F2
2704	Car to Car
2736	Gaming (LGCB)
2768	Narcotics
2800	Criminal Investigations
2832	Executive Security
2864	Department of Public Safety
2896	LSP-1
2928	LSP-2
2960	Coordinate Call
2992	Coord/Talk-1
3024	Coord/Talk-2
3088	Safety Enforcement
3120	State Fire Marshals

LSP Troop F Talkgroups

Troop F is headquartered in Monroe and led by Capt. Don McDonald. Troop F includes the following parishes: Caldwell, East Carroll, Franklin, Jackson, Lincoln, Madison, Morehouse, Ouachita, Richland, Tensas, Union, and West Carroll.

Talkgroup	Description
3216	F1 Dispatch
3248	F2
3344	Car to Car
3376	Gaming (LGCB)
3408	Narcotics
3440	Criminal Investigations
3472	Executive Security
3504	Department of Public Safety
3536	LSP-1
3568	LSP-2
3600	Coordinate Call
3632	Coord/Talk-1
3664	Coord/Talk-2
3728	Safety Enforcement
3760	State Fire Marshals

LSP Troop G Talkgroups

Troop G is headquartered in Bossier City and led by Capt. Ron Whittaker. Troop G includes the following parishes: Bienville, Bossier, Caddo, Claiborne, De Soto, Red River, and Webster. It includes the metropolitan Shreveport area.



Talkgroup	Description
3856	F1 Dispatch
3888	F2
3984	Car to Car
4016	Gaming (LGCB)
4048	Narcotics
4080	Criminal Investigations
4112	Executive Security
4144	Department of Public Safety
4176	LSP-1
4208	LSP-2
4240	Coordinate Call
4272	Coord/Talk-1
4304	Coord/Talk-2
4368	Safety Enforcement
4400	State Fire Marshals
6448	Supervisors Regroup

LSP Troop I Talkgroups

Troop I is headquartered in Lafayette and led by Capt. Walter "Tommy" Legembre. Troop I includes the following parishes: Acadia, Evangeline, Iberia, Lafayette, St. Landry, St. Martin, St. Mary, and Vermilion.

Talkgroup	Description
4496	F1 Dispatch
4528	F2
4624	Car-to-Car
4656	Gaming (LGCB)
4688	Narcotics
4720	Criminal Investigations
4752	Executive Security
4784	Department of Public Safety
4816	LSP-1
4848	LSP-2
4880	Coordinate Call
4912	Coord/Talk-1
4944	Coord/Talk-2
5008	Safety Enforcement
5040	State Fire Marshals

LSP Troop L Talkgroups

Troop L is headquartered in Mandeville and led by Capt. Luke Pingno. Troop L includes the following parishes: Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington.

Talkgroup	Description
5136	F1 Dispatch
5168	F2
5264	Car to Car
5296	Gaming (LGCB)
5328	Narcotics
5360	Criminal Investigations
5392	Executive Security
5424	Department of Public Safety
5456	LSP-1
5488	LSP-2
5520	Coordinate Call
5552	Coord/Talk-1
5584	Coord/Talk-2
5648	Safety Enforcement
5680	State Fire Marshals

Louisiana Department of Transportation and Development (DOTD)

Dr. Kam Movassaghi leads the Louisiana DOTD staff 5,300 with a budget of \$1.1 billion. The department is responsible for highway construction, tourism, motorist assistance, and the Louisiana Offshore Oil Port.

At first glance agencies such as DOTD could seem like ho-hum monitoring. However, during events such as hur-

Table 2. Statewide list of control channels

855.8875	855.9875	858.2375
858.4625	859.2375	859.4625
859.7625	859.9625	859.9875
860.2375	860.2625	860.4375
860.4625	860.4875	860.7125
860.7375	860.7625	860.9625
860.9875	867.3125	867.7125
867.8250	868.3750	868.4375
868.7875	868.8625	868.8875
868.9125	868.9375	

ricanes, floods, ice storms, and major construction they become valuable sources of information.

The DOTD is divided into nine districts.

DOTD District 2

District 2 includes Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. John, and Terrebonne parishes. This district includes the metropolitan New Orleans area.

Table 3. Louisiana state conventional frequencies

Talkgroup	Description
8656	Main
8688	Auxiliary
8720	Weight Enforcement
8752	Unknown
8784	Communications
8848	Maintenance

DOTD District 3

District 3 includes Acadia, Evangeline, Iberia, Lafayette, St. Landry, St. Martin, St. Mary, and Vermilion parishes. St. Martin parish has a geographical oddity. The parish is not contiguous. Iberia parish slices St. Martin in two. During the early 19th century St. Mary parish was created from parts of St. Martin and Iberia. This coupled with a surveyor's error resulted in St. Martin parish being divided.

Talkgroup	Description
8880	Main
8912	Auxiliary
8944	Weight Enforcement
8976	Unknown
9008	Communications
9040	Traffic Services
9072	Maintenance

DOTD District 4

District 4 includes Bienville, Bossier, Caddo, Claiborne, Desoto, Red River, and Webster parishes. The district includes the metropolitan Shreveport area.

Talkgroup	Description
9552	Main
9584	Auxiliary
9616	Weight Enforcement
9648	Unknown
9680	Communications
9712	Traffic Services
9744	Maintenance

DOTD District 5

District 5 includes East Carroll, Jackson, Lincoln, Morehouse, Ouachita, Richland, Union, and West Carroll parishes. This district includes the metropolitan Monroe area.

Talkgroup	Description
9776	Main
9808	Auxiliary
9840	Weight Enforcement
9872	Unknown
9904	Communications
9936	Traffic Services
9968	Maintenance

DOTD District 7

District 7 includes Allen, Beauregard, Calcasieu, Cameron, and Jeff Davis parishes. This district includes the metropolitan Lake Charles area.

Talkgroup	Description
9104	Main
9136	Auxiliary
9168	Weight Enforcement
9200	Unknown
9232	Communications
9264	Traffic Services
9296	Maintenance

DOTD District 8

District 8 includes Avoyelles, Grant, Natchitoches, Rapides, Sabine, Vernon, and Winn parishes. This district includes the metropolitan Alexandria area.

Talkgroup	Description
9328	Main
9360	Auxiliary
9392	Weight Enforcement
9424	Unknown
9456	Communications
9488	Traffic Services
9520	Maintenance

DOTD District 58

We did not forget forty-nine DOTD districts. The numbers simply jump. District 58 includes Caldwell, Catahoula, Concordia, Franklin, LaSalle, Madison, and Tensas parishes.

Talkgroup	Description
10000	Main
10032	Auxiliary
10064	Weight Enforcement
10096	Unknown
10128	Communications
10160	Traffic Services
10192	Maintenance

DOTD District 61

District 61 includes Ascension, Assumption, East Baton Rouge, East Feliciana, Iberville, Point Coupe, St. James, West Baton Rouge, and West Feliciana parishes. This district includes the metropolitan Baton Rouge area.

Talkgroup	Description
8208	Main
8240	Auxiliary
8272	Weight Enforcement
8304	Marine Operations
8336	Communications
8368	Traffic Services
8400	Maintenance



DOTD District 62

District 62 includes Livingston, St. Helena, St. Tammany, Tangipahoa, and Washington parishes.

Talkgroup	Description
8432	Main
8464	Auxiliary
8496	Weight Enforcement
8528	Unknown
8560	Communications
8592	Traffic Services
8624	Maintenance

Local Agencies

Some sheriff's offices and police departments have talkgroups on the state system.

Talkgroup	Description
49168	Ascension Parish Sheriff's Office - Dispatch
49200	Ascension Parish Sheriff's Office - Juvenile
49232	Ascension Parish Sheriff's Office
49264	Ascension Parish Sheriff's Office - HQ
49296	Ascension Parish Sheriff's Office - TAC
49328	Gonzales PD - Dispatch
49648	Beauregard Parish Sheriff's Office - F1
49776	Beauregard Parish Sheriff's Office - F2
49584	Cameron Parish Sheriff's Office
41424	Causeway Police F-1/East Jefferson Levee PD
41456	Causeway Police F-2
33072	Golden Meadow PD
49424	Lafourche Parish Sheriff's Office F-1
49456	Lafourche Parish Sheriff's Office F-2
49488	Lafourche Parish Sheriff's Office F-3
49520	Lafourche Parish Sheriff's Office F-4
49360	Lafourche Parish Sheriff's Office F-5
49392	Lafourche Parish Sheriff's Office F-6
34000	Lafourche Parish Sheriff's Office
33328	Lafourche Parish Sheriff's Office - Supervisors
33136	Plaquemines Parish Sheriff's Office

American Red Cross

The people of Louisiana are a resilient bunch. Hurricanes in the Gulf of Mexico often find their way to the shores of the Bayou State. The Mississippi River is prone to flooding and much of New Orleans lies below sea level. Thankfully, the American Red Cross is always ready to respond to disasters and they have a number of talkgroups on the system.

Talkgroup	Description
33584	Baton Rouge
33616	New Orleans
33648	Houma
33680	Lake Charles
33712	Alexandria
33744	Monroe
33776	Shreveport
33808	Lafayette
33840	Covington

Louisiana National Guard

The American Red Cross is not the only agency that gets involved when Louisiana needs help. Civil defense responsibilities fall on the Louisiana Office of Homeland Security and Emergency Preparedness, a department of the National Guard. Since this office works in conjunction with the State Police, they are organized along the same lines as the LSP.

Talkgroup	Description
20528	Administration - Troop A
20560	Operations - Troop A
20592	Secondary - Troop A
20656	Administration - Troop B
20688	Operations - Troop B
20720	Secondary - Troop B
20784	Administration - Troop C
20816	Operations - Troop C
20848	Secondary - Troop C
20912	Administration - Troop D
20944	Operations - Troop D
20976	Secondary - Troop D
21040	Administration - Troop E
21072	Operations - Troop E
21104	Secondary - Troop E
21168	Administration - Troop F
21200	Operations - Troop F
21232	Secondary - Troop F
21296	Administration - Troop G
21328	Operations - Troop G
21360	Secondary - Troop G
21424	Administration - Troop I
21456	Operations - Troop I
21488	Secondary - Troop I
21552	Administration - Troop L
21584	Operations - Troop L
21616	Secondary - Troop L
21648	Civil Support Team

Federal Government

The Mississippi River is vital to our nation's security and economy. Drivers across the country learned this in February 2004 when a supply ship collided with a container ship at the entrance of the river. This closed the river to all ocean-going vessels, which meant oil tankers from the Gulf of Mexico could not offload their cargo, immediately driving up petroleum prices.

The United States Coast Guard (USCG), United States Customs Service (USCS), and the FBI all work to keep river traffic flowing smoothly and protect our nation against unwanted visitors.

Talkgroup	Description
6544	USCS
6960	USCG Marine Safety Services
7024	USCG Marine Safety Services
32944	Military Operations
34640	USCG Marine Safety - Morgan City
34832	FBI Task Force
34960	USCG Marine Safety Office - Spill Response

Conclusion

The unofficial motto of Louisiana is “*Laissez les bons temps rouler*” meaning “Let the good times roll.” There’s plenty to see and do in the Bayou State. From the night life of New Orleans’ French Quarter to the quiet quarters in the bayou, Louisiana has something for almost everyone. Bring your appetite for beignets and etouffée and remember to pack your scanner!

Narrowbanding and Your Scanner

By David T Stark

My scanner can't display all those digits. Will I still be able to hear the conversations?"

"Should I buy a new scanner now or wait until a narrowband scanner comes out?" "My scanner already has FM-Narrow mode, so what's the big deal?"

Questions like these are being asked more and more often as agencies around the United States begin using newly authorized "narrowband" or "splinter" frequencies, especially in the VHF-High (150-174 MHz) range. So far, activation of these channels has been sporadic, although the pace is increasing. (For the new band plans, go to <http://www.monitoringtimes.com>, Radio Reference Library. "VHF/UHF Frequency Allocations" provides an overview and more specific breakdowns are also available by service.)

In many ways, current scanner hobbyist concern over "narrowbanding" is reminiscent of several earlier advances in radio technology. Back in the 1970s, the opening of the UHF band (450-470 MHz) made VHF-only scanners obsolete in some parts of the country. Further expansion into the television or "T-band" (470-512 MHz) sent more scanner listeners back to the radio store.

More recently, many of us have had to upgrade our scanners in response to 800 MHz allocations, trunking, and digital voice radio. Scanner technology usually lags behind technological advances in commercial radio, but it eventually catches up in a fairly short time.

In other ways, however, the change to "narrowband" emissions on VHF and UHF is going to affect the scanner hobby more generally than did the above advances. Before exploring these differences, we need to understand what "narrowband" means in this context and why two-way radio users (and scanner listeners) will have to upgrade their equipment again.

As you probably know, the Federal Communications Commission (FCC) is the American government agency that regulates non-federal radio usage and technology. One of the FCC's responsibilities is to make sure that entities that use radio communications have access to sufficient radio spectrum – enough frequencies – to meet their needs. The amount of radio spectrum available for the FCC to issue new licenses to use is limited by physics, population, international treaties, and technology.

Physics

Radio frequency spectrum is a limited resource. You might have heard the expression "DC to daylight" as a description of radios that can operate over the widest possible range of frequencies. In actual fact, while the electromagnetic spectrum does cover that entire range, the portion of it that we use for radio is relatively small. It has lower and upper limits, and once all of the possible frequencies between those limits are in use, there will be no more available. Also, any modulated signal occupies a range of frequencies, represented by a measurement called "bandwidth."

The FCC cannot alter the laws of physics.

Afraid you'll be missing out on the action on new split frequencies? Worry no longer! Here's how it works, plus a few tips to improve your reception. (Photos by Garry W. Watts)



Population

Major metropolitan areas contain many potential users of, and uses for, radio frequencies. Some large population centers are concentrated into relatively small land areas, while others sprawl over considerable distances. But, within any of these metro areas, a signal on any given frequency probably can be received over the entire area. Any other transmitters using that same frequency would cause interference, which can render all of the signals useless.

The FCC cannot control population density.

International Treaties

Near international borders, radio frequency availability is subject to agreements between the respective national governments as to how they will share the radio spectrum and minimize interference between users on either side of the border. When a major metropolitan area develops in a border area, the needs of the population for multiple frequencies can collide with the FCC's obligation to see that frequencies in the United States are licensed according to the terms of any relevant treaties.

The FCC has little, if any, influence over international treaties and simply must abide by them.

Technology

In order to ensure that radio users can obtain radios from various manufacturers that can be used together, the FCC imposes technical stan-



dards onto the way radio signals can be generated. Because the various methods that exist to produce a radio signal create signals with different characteristics, the FCC must regulate such things as mode (like AM, FM, and others) and bandwidth (how many frequencies a signal that is carrying information may occupy). A transmission technology that can carry as much information as another while using fewer frequencies to do so is more spectrum efficient. If adjacent signals overlap each other too much, they interfere with each other. For any given level of spectrum efficiency available, the FCC can authorize the use of a particular number of frequencies, but no more.

The FCC can affect the technological capabilities of radio equipment by changing its regulations to require, for example, more spectrum efficiency.

Previous Solutions to Frequency Shortages

Radio frequencies were originally allocated in groups, bands, or "blocks" according to their intended uses. If an entire block of frequencies that had been set aside for a certain purpose (such as police radio) got used up, then the FCC could solve the problem by reallocating frequencies from a different block. This happens in the largest metro areas where two-way communications can be found on frequencies that are allocated for television broadcasting everywhere else, or where land mobile signals are authorized on marine channels in areas that have no nearby navigable waterways.

As mentioned earlier, this solution has one unbreakable limitation. There is still only so much radio spectrum to go around. Eventually, there would be no more unused blocks to reallocate. What is needed is a way to squeeze more radio signals into the available spectrum. If you've stuck with us this far, you probably can anticipate the solution.

The New Solution

You guessed it! Tightening the technical standards to force radios to be manufactured that can carry voice and other traffic on a narrower slice of the spectrum than is used currently, or with greater spectrum efficiency, would have the effect of making room for more signals. That is exactly what the FCC has done.

In its Third Memorandum Opinion and Order under W.T. Docket No. 99-87 (FCC 04-292), the FCC has mandated that all two-way radio equipment used on VHF and UHF by public safety or businesses must be using "narrowband" technology by January 1, 2013.

How Narrow is "Narrowband"?

The FCC does not use the same terminology to describe radio emission modes as the scanner manufacturers do. The Commission uses the terms Ultrawideband, Wideband, and Narrowband to describe voice or data emissions in what we know as the scanner bands. What scanner listeners know as "narrowband" on current scanners is the FCC's wideband. For example, such signals (in the UHF band) are authorized to occupy a bandwidth of 25 kHz, or 12.5 kHz on either side of the center

frequency (which is where we tune our scanners). The new FCC narrowband specification allows signals that are 12.5 kHz wide, or 6.25 kHz on either side of center.

Because the signals are half as wide, channel centers can be half as far apart, creating twice the number of channels. The current VHF high band (150-174 MHz) uses 15-kHz channel spacing, so that we tune to frequencies like 154.160, 154.175, and 154.190, for example. Narrowbanding will create channels at 7.5-kHz intervals on VHF, or 154.160, **154.1675**, 154.175, **154.1825**, 154.190, etc.

The same bandwidth standards will apply on UHF (421-512 MHz) as well, but the old and new channel spacings are different from VHF. Current UHF spacing is 12.5 kHz, as in 460.000, 460.0125, 460.025, 460.0375, and 460.050, for example. The new interval will be 6.25 kHz, so the same amount of spectrum will have channels centered at 460.000, **460.00625**, 460.0125, **460.01875**, 460.025, **460.03125**, 460.0375, **460.04375**, and 460.050, etc.

We describe these frequency changes and channel additions in the future tense, because the deadline for full compliance is in the future, but the new in-between frequencies have already been authorized and some narrowband radios are already in use.

Where Will Narrowbanding Apply?

Everywhere in the United States! Unlike previous changes in radio allocations that only affected people in densely populated areas where frequency spectrum was already running short, the FCC's mandate for narrowbanding applies to every radio user on VHF and UHF regardless of where they are in the country.

The FCC is also working on high-efficiency standards for existing 800 MHz allocations, and for the upcoming 700 MHz bands. The Commission is also cooperating with efforts to establish possible separate narrowbanding requirements for certain frequencies used by federal agencies that are not licensed by the FCC.

Is My Scanner Obsolete?

You might not need to rush out and shop for a narrowband-capable scanner right away, or you could already be experiencing the effects of narrowbanding in your listening area. A scanner that will be able to handle narrowband signals as well as wideband transmissions needs to have two specific features:

- **The ability to tune in 7.5-kHz intervals on VHF and 6.25-kHz intervals on UHF.**
- **Receiver filtering that will allow only the desired narrow signal to be heard.**

There are very few scanning receivers on the market right now that have the first feature. Some of them are amateur transceivers with wide coverage receivers. In some units, such as the Radio Shack HTX-420 (now discontinued), the 7.5 kHz tuning is not accurate outside the two meter ham band.

To this author's knowledge, there are no existing scanners that operate in true narrowband mode, regardless of how closely they can tune the frequencies. There are high-end communications

receivers that have the necessary filtering available, but no scanners yet. (Corrections to this assertion would be accepted gladly.)

Don't panic, though: You can still listen to these new narrowband signals on your existing scanners. The narrowband signals will simply sound about half as good as wideband signals. This is because your scanner lacks the two necessary features mentioned previously.

Without the ability to tune the exact center frequency, your scanner will be off to one side or the other, so some signal quality can be lost. The lack of narrow filtering is a two-edged sword. On the one hand, it allows you to hear the off-channel narrowband signal rather than screening it out. On the other hand, your wider-than-needed receiver bandwidth allows other signals and interference to "ride along" with the narrowband signal, making that particular signal sound weak and perhaps muffled.

Depending upon the tuning steps available in your scanner, you might be able to minimize interference from stronger (and wider) adjacent signals by creative tuning. For example, suppose you want to monitor a narrowband signal on 154.1675 MHz. Many scanners can tune the VHF band in 5-kHz steps, so you have a choice of 154.165 or 154.170 as the closest frequencies to the target that your scanner can tune. Neither frequency will be "better" because they are each off frequency by the same amount. But, if there is another signal on a nearby wide channel, you can improve your reception of the narrow signal by tuning away from the wide signal.

In other words, if the interfering signal is on 154.160 MHz, then you should get clearer reception on the narrowband frequency by tuning to 154.170, because it is farther away from 154.160. On the other hand, if the interference is coming from 154.175, then your best choice would be to tune 154.165 MHz.

If your desired narrowband target is stuck between two active wideband channels, then you could "tune away" from the busier one. It might be necessary to use the attenuator if your scanner has one, or even to remove the antenna if it's a portable scanner.

New narrowband systems are coming on line all the time, so keep your eyes peeled for news online and in *Monitoring Times*, keep checking for activity on the new splits in your area, and report what you hear so others can join in. And remember, narrowband doesn't have to make your equipment obsolete – it just doubles the number of frequencies you can tune in!

Try This!

Even if there are no narrowband signals in your area yet, you can get an idea of what they would sound like if you have a scanner with a "wide" FM mode. Just tune to an active VHF or UHF channel and put your scanner into the wide mode. Use a signal that is not received at full strength for the best demonstration. The signal will sound weaker and noisier. That is approximately what a narrowband signal will sound like (perhaps worse if you have to tune off-frequency) on your scanner in the "narrow" FM mode.

Birth of a Station

By Todd Van Gelder

AM – The Universal Standard

In an age when the radio industry is forever pushing new technologies (Satellite, the next big thing! Digital radio, the next big thing!), it's nice to know that good old analog AM radio is the "big thing" in the world of motorist and security information. As a Senior Systems Analyst under contract to the National Institutes of Health (NIH) in Bethesda, Maryland, I have seen tremendous changes over the last three years. Indeed, just after arriving at home from work one night last fall, I remarked to my 6 year old son (who is often fascinated by such observations) that in 1 week, a 250 car, 5 story parking garage had sprung up where there was a 30 car lot the week before!

Although I may have cut the construction time by a few days for dramatic effect, new buildings and facilities at the main NIH campus have been going up at a remarkable rate. Although it has become somewhat cliché to cite how the country has changed post 9/11, everywhere you look at NIH, post 9/11 change is evident. NIH's primary mission is to prevent, detect, diagnose, and treat disease and disability, yet a goal that has risen to the top of the priority list has been to fight the threats posed by bioterrorism. Current facilities just don't provide enough room.

Keeping the Community Informed

Construction projects and special events are nothing new at NIH. However, with the recent rapid expansion, one of the major challenges faced by Thomas Hayden, NIH's Director, Division of Travel and Transportation Services, has been keeping staff, visitors, and patients informed about ever changing traffic patterns on campus.

In order to meet this challenge, several years ago Mr. Hayden proposed the installation of a Travelers Information Station (TIS). These stations are also sometimes referred to as HARS (Highway Advisory Radio Systems). However, the proposed radio station didn't become a reality until post 9/11 funding became available.

After researching TIS service providers and following the government procurement process, Mr. Hayden and his staff settled on Highway Information Systems Inc. (HIS) of Durham, N.C. HIS not only sells complete AM transmission systems to the TIS market, it also handled the complex licensing process for NIH. Licensing

of a TIS for a federal agency involves not only obtaining an FCC license, but an additional application process via the National Telecommunications and Information Administration (NTIA). The NTIA oversees frequency usage by the federal government.

Finding a Frequency

As I sat at a traffic light waiting to turn into one of the main NIH entrances in the fall of 2003, I noted a large, automated message sign telling me to "Tune to 1610 AM for NIH traffic information." I was intrigued. So I tuned in and heard warnings of impending road closures and information about upcoming events. I began to use this new resource frequently, until one day the station seemingly disappeared. Had this station been only temporary, I wondered? Perhaps a project whose plug was pulled? It was nothing of the sort. The station was simply told to move up the dial a little.

Once the system was purchased and installed, NIH was initially given permission to operate on 1610 AM. A temporary license was issued in the late summer of 2003 and the call letters KFQ-70 were assigned. Typically, these licenses expire after 6 months, but the originally assigned frequency usually stays the same once the permanent license is assigned. However, with a 1kW Spanish radio station WLXE-1600 AM, Rockville, MD, just 10 kHz and 6 miles away, there were interference problems for both stations. So, when the final license was issued, the unused frequency of 1660 AM was assigned.

AM Radio, the Core of the System

The HIS system installed at NIH includes a digital recorder/player, a remote recording and control system (which can be accessed via telephone), integrated variable message signs and flashing beacons for traffic control. At the heart of the system is a 10 watt AM transmitter which feeds a precisely tuned transmitting antenna which tops out at 49 feet above the ground. The antenna uses a triad based grounding system. All the devices are controlled by PC based software.

The fact that the antenna tip sits 49 feet above ground is not random. The FCC limits TIS antennas to a maximum height of 15.0 meters (49.2 feet). However, the actual antenna length is determined by the frequency of the transmitter. After installation, the antenna was mechanically tuned for the best performance possible. In short,



The self contained 10 watt AM radio station KFQ-70 has a typical range of 4-6 miles. Tower height is 49 feet. Photo, courtesy NIH.

every step was taken so NIH could get maximum distance out of a system with both power and antenna height restrictions.

Typical transmission distance during daylight hours is estimated at around four miles. However, I have received the station over seven miles from the transmitter. As night falls and propagation kicks in, reception of KFQ-70 typically goes one of two ways: if I'm close to home, which is beyond 4 miles, it gets crushed by skip from what I presume is 1660-WWRU, Elizabeth, NJ, a Spanish station; otherwise, it has the frequency to itself and can be heard until I'm well north of Baltimore (over 100 miles away!). Given the roller coaster ride of solar activity recently, reception is anything but predictable.

Success, DX and the future of TIS

Mr. Hayden is extremely happy with the way the system has worked so far. In fact, this installation has been used as a demonstration site for other interested government agencies. It looks like TIS has a promising future on the AM dial. Travelers Information Stations seem to be a DX target, too. I have seen numerous mentions of TIS loggings in *MT* in the past year. Kraig Krist even mentioned hearing the NIH outlet in loggings submitted to *MT* in April of 2004.

To those industry folks forecasting the demise of AM radio, don't tell the thankful motorists out there who rely on TIS outlets to get them to work each day or the DXers who log these new low power targets. An AM radio in a car is a universal feature that still gets us the information we need and there are no subscription fees.

Hello from Alfa Lima International

By Alfred E. Zoer

Welcome to the first lines from me, Alfred Zoer, in *Monitoring Times*. A few of you might know me from the free radio station Alfa Lima International (<http://www.alfalima.net>).

As I'm bigtime involved in the free radio scene on medium and shortwave, I thought readers might enjoy an occasional piece about the wonderful world of free radio on short and medium wave. Many of you know already that there are pirates active on shortwave and that you can often find the European stations between 6.200 and 6.300 MHz AM and, in the USA, in the area of 6.955 MHz in USB.

You will find unlicensed broadcasters in very different programming and powers. For example, we see that pirate stations in the United Kingdom often have a very professional sounding program with low power that varies from 5 to 50 watts, running tapes from secret locations. The Dutch and German pirates often transmit from their own homes with powers that go up sometimes to 5 or 6 thousand watts, with programming that usually contains lots of music with announcements only now and then. When we take a look at pirates in the USA, we often hear stations that have political reasons to launch their transmissions or who mostly run comedy programming.

What many of you might not know is that some stations use higher frequencies to reach listeners in other continents and that they are often very successful in doing so. Our station is often on 15.070 MHz AM, but a number of stations also use 15.800, plus or minus 25 kHz, and have achieved some remarkable distances with good reports, even though they are often transmitting with very low power.

Of course, there are more high frequencies that are used. A few pirates from

the Netherlands are sometimes testing on 13.865 and lately there have been some tests on 17.465 and 17.470 by the Dutch stations Black Arrow and Space Shuttle International. Also don't forget the 21.900 MHz area (+/- 25 kHz).

There are a number of other frequencies that pirates use we have not mentioned, but the point is, you can never really be sure where pirates will pop up as they are operating outside the rules. You never can pinpoint them to a time or a few specific frequencies. Trying to listen to pirate stations on shortwave can be a real sport, especially if you try to catch them from other continents – the powers are low, you are never really sure when they are transmitting, and on top of it all, you often need good conditions. So, trying to listen to pirate stations can bring an extra dimension to shortwave listening.

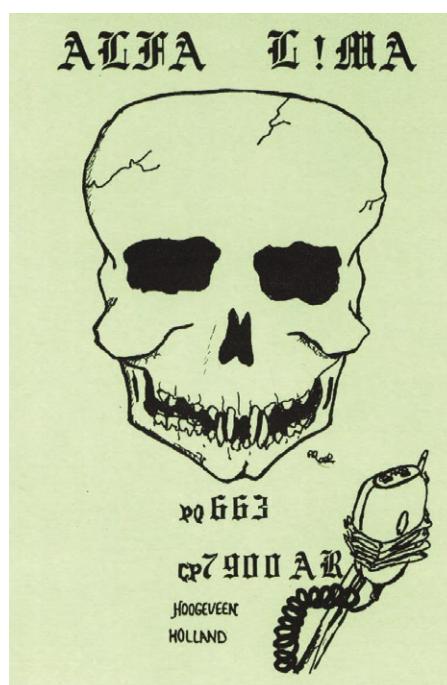


There is a nice yahoo group about shortwave pirates that gives recently-heard frequencies and tentative schedules, which might be of interest if you would like to try your hand at catching pirate stations. The URL of the group is <http://groups.yahoo.com/group/SWpirates> Joining this group should give you a nice start in catching them. Or, just use keywords like "short wave pirates" in a search engine like Google to find more about this aspect of shortwave listening.

All that is left for me to say in this edition: "Happy pirate catching."



The Alfa Lima International studio



Courtesy blackcatsystems.com



Alfa Lima's Rhode & Schwarz transmitters

On Writing Club Newsletters

By Arthur R. Lee WF6P

My wife Donna, AB6XJ, was in bed with the flu and not hungry. She suggested that I go to our favorite cafe for dinner. "Take along some magazines and catch up on your reading," she said. That sounded good. For some light reading I gathered up a copy of *Aviation Week*, *QST*, and the February 2004 issue of *Monitoring Times*.

My monthly column for our ham radio club newsletter was due, so I took along a note pad in case I came across something of interest. I only had to go as far as the first few pages of *Monitoring Times* to find "May The Law Be With You" by Jorge Rodriguez. He discussed a ham's misadventures with the law. It had to do with ham gear mounted in an automobile in New York state. For those of us who have or intend to operate mobile, it was an eye-opener.

Then, on page 22, *MT* editor Rachel Baughn, KE40PD, wrote "Save Your Local Airport!" about air-to-ground communications and navigational aids for general aviation pilots. My on-the-air friend Carrie Jenkins, KI6QO, owns her own Cessna 152, so she will be interested. A couple of our club members are also pilots.

I've been writing my "Chatter" column for over a decade and enjoy doing it. Our club has a membership of over a hundred and I know most of them by their call sign, name or on sight. I am familiar with some of their hobbies outside of ham radio: stamp collecting, history, genealogy, old farm machinery, etc., so I can crank out stories relating to those topics if necessary. My rule is to always link the stories to ham radio, even if the connection is a rather long stretch. I carry a little notebook to our club activities such as meetings, Field Days, ARES training and parties. Usually there is some little joke or incident I can write about. We have fun, and our guest speakers are always good for a paragraph or two of write-up.

In by the Back Door

I began my newsletter writing sort of by default. Our club

president asked me to write a short note about some ham happening, which I did. At first I only wrote a few paragraphs and managed to include something about a club member or two I had seen or worked with, either on the air or in person. Then, to fill my column, I included details of some of the interesting QSOs I had during the month or what amazing thing happened to me "on the way to the forum."

I specialize in Maritime Mobile nets, so there are ample sea stories to relate. As our Santa Cruz amateur radio club is located in the coastal town of its name, many of our members set out on their boats for lands far beyond the salty horizon. Prior to a big winter storm blowing the elements off my tri-bander beam, I kept in touch. This gave me plenty of material for what had by then become my monthly column. We were all interested in the strange lands our club members were visiting. In the 1980s

before email and GPS, life away from home and at sea was fraught with danger at times. Snail mail from a boat in the Indian Ocean was, shall we say, rare or even non-existent.

Making the Commitment

So what does a prospective newsletter columnist have to face? Well, for starters, a monthly deadline date has to be met if the editor is depending upon you to fill his "white space." This really isn't hard to do if you mark your calendar well in advance. The next step is the gathering of material. One of my CW pals, Marsha Messer, AB7RJ, lives in the state of Washington. She said she wouldn't want to do it "because a writer has to go around all the time, thinking of things to write!" She's right, of course, but I find that to be the fun part.

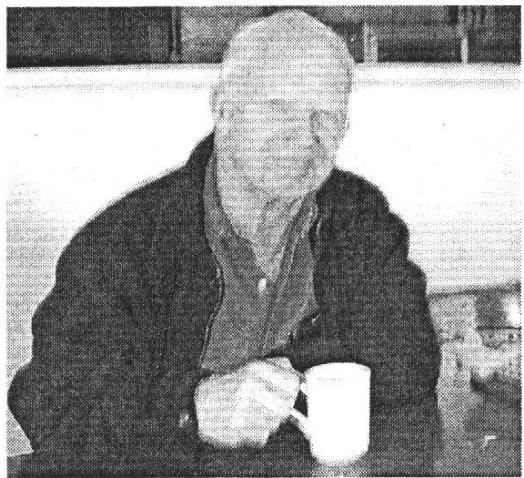
In my column, I like to mention names of club members and their activities. If I see

a member in a coffee shop, out sailing, or in the medical clinic, it rates a line or two, maybe more. Everyone, it seems, likes to be written about. I did have one club member who asked me not to put it in the newsletter that she was pregnant. I don't know why. We were happy for her when she delivered a bouncing baby girl.

I always try to keep things on the light side. But there is always the inevitable passing away of a club member that cannot go unmentioned. A short write-up is all that is needed for a Silent Key (SK). Many of our club members have moved out of town but still receive their newsletters and want to keep up with the status of old friends. As with lifetime friendships, visiting a relocated ham in his new QTH is rewarding. One of my favorite topics is: Where Are They Now? Under this heading, out of town members get top billing.

A good source of information is our Monday night two-meter club net. Our members check in, offer their QSTs, and club officers give their reports. This is followed by an "open mike" session where everyone is invited to give a "15 second sound byte." (It's a good thing

Member Profile WF6P



My day began with a visit to Frank K6BDK who was donating some coax for the AO-40 project and he was excited to tell me he had worked ZS on 40 meters the night before using PSK-31. He said times and technology change but the magic of communicating via radio is what our hobby is all about.

Speaking of communications my next stop was to meet Art Lee WF6P at his favorite donut-coffee shop. Art might best be described as a multi-tasking communicator. We are all familiar with his regular "Chatter" articles in Short Skip but he is also a prolific writer for a wide

variety of magazines. One such magazine called "Monitoring Times" mirrors Arts very first exposure to Short Wave Listening. That first exciting demo in 1945 of a Hallicrafters S20 R tuned to a South American BC station lead to half a lifetime love of Ham Radio in the wider context.

we have a limit! Hams love to talk.) I usually jot down a few notes for the column.

Lastly, we have kept up with technology and have a club website (<http://www.k6bj.org>). On the K6BJ website "Reflector," club

members can post messages about equipment problems, ask questions of a technical nature, list items for sale, add reminders of meetings — and yes, even the deadline dates for the newsletter.

Giving Back is also Fun

As my old friend and mentor Leon Fletcher, AA6ZG, a frequent contributor to *Monitoring Times* says, "There is so much to write about!" He's right, and so is Marsha. But once into the newsletter writing habit, it is fun.

Pay for a club newsletter contributor or editor is very high – in recognition, at least. It can even result in a pat on the back at the annual Christmas party! We are fortunate to have an excellent editor. Ron Baldwin, K6EXT, has been putting out the newsletter for several years. What started out a couple of decades ago as a simple monthly postcard mailed to members, graduated to a single typewritten page (written, published and mailed by the club president). It has now evolved into a 5 or 6 page newsletter filled with club news featuring photos, sidebars and individual contributions. The introduction of digital photography made photo work easy.

If your ham club has a newsletter, contact the editor about submissions or just send him or her your material. I'm sure that they will welcome your help. If you don't consider your writing as "professional" don't worry about it. After all, we are amateurs! Just write like you talk (Hello, Wayne Green!). Think of it as a letter to your friends. Club members will not complain if you are not a Pulitzer Prize winning novelist. Who knows, if you keep at it long enough, it might come your way! Hi! Hi!

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Out-of-the-Box Success for Digital Beginners

It's not every day I get ham radio operating advice from a 7 year old, but that's just what I got last year from young Mattie Clausen AE7MC, when I asked her what her favorite operating mode was. The Amateur Extra Class ham (who received her Tech Class ticket at the ripe old age of 5) said, "You've gotta try PSK31. It's great!"

I'd read about the mode, but since I didn't have the necessary interface, software, and wasn't even sure my old Kenwood TS-140 was modern enough to work that mode without modifications, I passed on the suggestion. A few months later I was chatting with *MT* Assistant Editor Larry Van Horn and he was talking excitedly about PSK31. "It's great," he raved, "With hardly any signal at all you can work a station from around the world and on low power!" It was starting to sink in.

The final straw came towards the end of 2004 as the HF bands scraped along at the bottom of the solar cycle at depths even pessimists couldn't have foretold. The words of young Mattie and Ol' Larry echoed in my mind as I pondered a move to the digital side of amateur radio.

❖ The Simple SignaLink SL-1+

There are many sound card interfaces on the market. There are even plans for home-brewing your own. My previous foray into the digital world was several years ago when I used the Tigertronics' BayPac modem for DOS-based monitoring SSTV, WEFA, etc. And, when I went to their web site (<http://www.tigertronics.com>) I noticed they had a new product out which looked interesting.

The SignaLink Model SL-1+ is a very small, ruggedly built, sound card radio

interface which was so shamefully easy to configure and connected so quickly to both the rig and my computer that I was a little chagrined. The unit came with a mini-CD packed with various software programs for many of the most popular modes: BPSK31, SSTV (Slow Scan TV), RTTY, CW and others. In the CD you'll also find a 14 page installation and operating manual which can be printed and kept for reference while you're learning to use the SignaLink and operate the digital modes.

The first concern is how to configure the unit for your particular transceiver.

Tigertronics has simplified their own production costs by passing on the configuration to the end user. Using a handy chart and a number of provided "jumper" wires, the correct arrangement for Kenwood, Yaesu, and Icom transceivers is easily set up. You do need to be careful setting the jumper wires, as it is possible to break them if you're not paying attention. If a wire breaks off in the connector, you'll have to send the unit back at your own expense to have it repaired. Once done, however, you shouldn't have to do this procedure again unless you change transceivers.

The second concern is how to power the unit. In some cases the power from your radio's auxiliary jack will have the required 12 volts. Mine didn't, but I found a universal wall transformer from Radio Shack that worked fine. While the unit can be plugged into your mike jack, you'll find it more useful to use the AUX jack. This means you don't have to plug and unplug the mike as you switch from digital to SSB.

If you're going to use SignaLink only for monitoring you don't need any auxiliary power, because the SignaLink's receiver circuitry is active all the time. Even if you do have the unit powered, it will not transmit until the power button is pushed and the green power LED lights.

❖ It's All in the Software

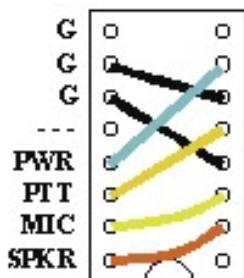
None of this works without the various software programs which are widely available. I started out with HamScope 1.54, which was on the SignaLink CD. It's free-ware and runs on Windows 9x, ME, 2000 and XP. There is a much better software package, known as MixW, which supports many more modes and has other features for serious users. But, for the MixW there is a two week demonstration period after which you're asked to register the product for \$50.

I started using the HamScope software and found it was easy to use from the very beginning and serves the novice digital operator quite nicely. It's a cheap (free!), painless introduction to the digital modes. There may come a time when you'll want something with more capabilities, particularly if you do contesting or use an electronic log book. MixW is very useful for this purpose and I found it to be the most popular software in use by digital enthusiasts I met on-air. DigiPan, another software package, is also popular on the bands and it, too, is on the CD ROM.

Loading the software is as easy as popping the disk into the CD reader and following the simple prompts. In the case of HamScope, you will also have to have a packet engine and a RTTY engine to work those modes. I downloaded the MMTTY program written by JE3HHT, Mako, from <http://mmhamsoft.ham-radio.ch/>. I found that for PSK and RTTY modes, HamScope did everything I needed it to do right from the start.

There may be updated versions of the software available at the home web sites of the software designers, so take a trip to their web sites and see. There will also be links to various related sites such as support groups and chat rooms which you might find helpful in ironing out any difficulties you encounter. There is a troubleshooting section to the SignaLink manual you should consult first. Here you'll find detailed tips on what to do when things just aren't working.

Whichever software you use, you'll find more and more useful features the more you



Beginner's Hits and Errors

It's easy to get started in the digital modes and it's just as easy to make on-air blunders. Here are a few tips to try to avoid looking too much like a beginner when you begin:

- Make sure you have turned off your speech processor or other mike compression adjustments, turned down the mike gain and turned off your VOX circuit before transmitting. Transmit/receive functions, including PTT delay, are handled by the Signalink. Since you're using Audio Frequency Shift Keying (AFSK), make sure the audio sounds on your computer are turned off, because they could end up in your transmission.
- Spend some time monitoring all the digital frequencies before you start transmitting. Get to know the protocol used by DX and domestic operators.
- Know what frequencies your license allows you to operate. Know if a station is operating "split" and follow the directions (transmitting on 14.070 and listening on 14.071, for instance).
- Pay attention to your screen settings and your rig settings. Going back and forth between side band and digital modes, simplex and split operations things can really get confusing. Before transmitting check to see that all your settings are correct.
- Make sure the correct call sign is in the "call" box and that you hit the right macro buttons when you want to. It's almost too easy to look like a complete idiot in the digital mode.

use it. Most have digital signal processing which allows you to operate under some extreme QRM (man-made interference). This was a big plus during some contacts.

Getting on the Air

Having installed the HamScope software, set the jumper wires in the Signalink, and made the necessary connections between the transceiver and the computer, I was ready to start looking for digital signals. The various digital modes are allowed on all HF bands (except 50 meters) in special sections. You have to know what the operating limits are before you can start transmitting. Below

is a chart of basic frequencies and a few tips on basic digital operations.

Most operators reduce their output power to 50 watts or lower. It's not uncommon to make contacts with stations running as low as 10 watts. The two main reasons for this are that at the full 100 watts your signal may be too broad and take up too much room in the band pass and, unlike CW (Morse code) or SSB (Single Side Band), the transmitter runs the whole time it's keyed, putting a lot of stress on your rig's final transmitting transistors.

At about 1430 Z I was tuning around 21.070, the PSK31 frequency on the 15 meter band. Watching the spectrum portion of the HamScope 1.54 screen on my monitor I saw a small spike in the display. I looked at the signal meter on the transceiver and it was not moving. It lay quietly all the way to the left of the meter not even flickering. I was very dubious.

I left clicked with the mouse with the cursor over the spike and instantly, in the received message portion of the display appeared "...CQ CQ CQ de SV8UM...." repeated several times. "Well," I thought, "Greece! But, there's no way he's going to hear my signal." I typed his call sign into the little window labeled "call" and, having already put my own call sign in the software setup, clicked on the "TX" button on the screen and then the "Call" button. The red PTT (Push-to-Talk) LED on the Signalink lit immediately and the rig sprung to life, sending his call followed by mine given twice. In seconds, the spike reappeared and SV8UM came back with my call and a signal report. I was totally amazed. On a signal strength which wouldn't have supported any readable voice transmission and would have made rough CW copy, there was 100% PSK31 copy!

With the output set to about 45-50 watts and using either a three-element tri-band beam or a simple wire antenna at 25 feet, I was soon working stations all over the world. Over the next two and a half months I made over 250 contacts with 90 countries from Europe, Africa, South America, Central America, the Caribbean, North America, Antarctica and Asia on PSK31 and RTTY. This was easier than working voice or CW – it was just a matter of tuning the bands looking for signals and then: point and click. At a time when the bands were "dead," there was suddenly new life on the airwaves!

Basic Digital Mode Frequencies

Band	PSK31	RTTY	SSTV
160 (Mtrs)	1.800-10	1.800-10	1.843-2.000
80	3.580	3.580 3.590 (DX Window)	3.845
40	7.070	7.040 (DX Window)	7.171
30	10.1371	10.130-140	
20	14.070	14.080-095	14.230
17	18.100-105	18.100-105	
15	21.070	21.080	21.340
10	28.120	28.080	28.680

The Digital Advantage

The digital sub-bands aren't nearly as crowded as the phone bands. Sure, there can be pile-ups, but nothing like the phone frequencies, because there are simply fewer digital operators. Here are some other advantages:

Digital modes work with any "modern" transceiver. All you need is a reasonable computer and a sound card interface.

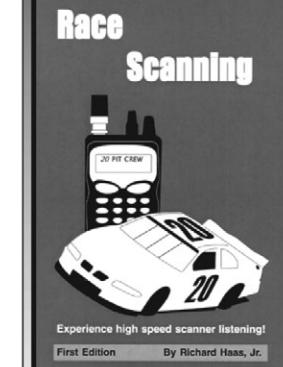
It's a great equalizer in working DX stations for those of us not packing the half kilowatt amplifiers and expensive antenna arrays. Since almost everyone's operating relatively low power, we all have a decent chance to be heard.

It's the best way to beat the "sunspot cycle blues." While all the side-banders have given up and turned to their aquariums and stamp collections, digital ops are still working the DX!

It's a stealth mode of operating in your home without disturbing anyone. There's no need for headphones or to even have the speaker on. You monitor all the action silently on the screen. You can actually be working the world in the same room as someone else who's watching TV, reading a book or listening to music!

Mattie Clausen and Larry Van Horn were right! Once you've started down the digital trail you'll wonder why you hadn't done it before. So, what's next? Well, I think I'll try SSTV!

Race Scanning



Chapters:

- History of race comms.
- What you can hear
- Racing terms
- Racing flags
- Choosing a scanner
- Tips and tricks
- Racing frequencies

By Richard Haas, Jr.

Listening to a

scanner radio at the track adds a dramatic new element to the race fan's experience. This book will help you be properly equipped and informed to enjoy the race from a new perspective. Listen to, and understand exciting real-time transmissions from the driver's seat and support communications from behind the scene. Printed September 2003 with up-to-date frequencies. #0031 Only \$4.95 (+\$2.00 ship)



Getting Started

Here's a question for our readers:

Q: I am trying to find an IC for my Realistic DX-300 receiver. The obsolete IC sources on the internet are of no use. The IC number is M54826P; the frequency counter is IC501. Do any of your readers have any ideas where I might get one or more?

(Jerry Beaudin, 2109 Co Rd 449, McMillan, MI 49853; 906-586-3021; kurro7@excite.com)

Q. Is there an easy way to contact the FCC to report excessive power, overmodulation splatter, and illegal tower height of AM and FM broadcasters? (Tom Shrilla, Westerville, OH)

A Yes. Try this web site: <http://www.fcc.gov/eb/broadcast/interference.html>

Q. I have my ICOM R-75 shortwave receiver connected via RG-8/U coax to a PAR END FEDZ wire antenna. The radio is grounded, but not the antenna. Is there another antenna system that can give me better performance? (Jimmy Fulford)

A. There are no magical antennas. For passive (unamplified) shortwave receiving antennas, you want a wire 20-70 feet long, fed with coaxial cable. The wire should be at least 20 or more feet in elevation (preferably 40 feet or so), and its broadside should face the direction of greatest interest. Keep it as far as practical from the house and power lines to reduce electrical noise pickup. The PAR END FEDZ (Grove ANT-08) is an outstanding antenna.

Unless you are hearing interference like splatter, images or intermodulation from an overly-strong local broadcaster, you don't need any additional contraptions like a tuner or filter with the R-75. RG-8/U is excellent coax; you can't improve upon it for shortwave reception.

Audio quality can be improved with an external speaker, and electrical noise can be reduced with noise-cancelling devices like the Timewave ANC-4 (Grove ACC-40) or DSP-599ZX (Grove FTR-05).

Grounding is optional with modern receivers; it may help reduce electrical interference and

prevent electrical shock if there's something wrong with the wiring, but it won't increase the signal level above the background noise (hiss). Since you're using coax, you've already grounded the antenna by grounding the radio chassis which is connected to the coax.

Q. As I look at a list of channel allocations for railroads (ch. 7-97), I wonder what happened to channels 1-6? (Dan Rapak WA3ATV)

A. As with TV's original channel 1 (48-54 MHz), they have fallen victim to spectrum reallocation; they are now assigned to business and industrial services.

Q. I saw the **Area 51: Fact or Fiction?** special on TV that you were featured in. What did you hear on the scanners, and weren't you taking a risk? (Dave T., Copley, OH)

A. The comms at the super-secret Air Force base were pretty routine with no attempt to guard the transmissions. Most of it was air-to-air simulated combat, aircraft flight, and perimeter security teams. There was some minor DVP scrambling.

Our video team remained on public land and we weren't making nuisances of ourselves, so we didn't pose a threat to the security teams, nor they to us. All in all, it was great fun and a delightful experience in the desert north of Las Vegas.

Q. Whatever happened to FM channel numbers? I think a few FM stations still included them in station identification back in the 1960s. And I think the **FM Guide** used them. (Ron Lindow, Pittsburgh, PA)

A. The FCC still lists FM frequencies along with their channel numbers in legal documents, but for some reason, channel numbers never seemed to be as popularly accepted in the United States as they were in Europe. Similarly, early wavelength references to radio signals were replaced by actual frequencies, although some foreign broadcasters still refer to their meter bands.

These radio signals are all discrete frequencies, whereas TV channels are multiple, separate carriers for sound, picture and synchronization signals throughout a 6 MHz hunk of spectrum,

so channel references were more practical for TV allocations.

If any of our radio historians have additional information on the abandonment of radio channel and wavelength references, we'd be happy to share this with our readers.

Q. We use an AM radio in a steel-roof building, but interference from the ceiling fans with an adjustable rheostat and fluorescent lights is very bad. The adjustable fan produces the most static. Any solutions? (Greg Kraushaar, St. Paul, MN)

A. AM radio interference from fluorescent lights, speed-controlled fans and dimmer controls on lights is well documented. If you are using commercial wall speed control/dimmers, you can often reduce some of the interference by installing a capacitor, typically 0.047 (0.05) microfarads at 600 working volts (600 WV) across the control terminals that feed the fan or lights. Be sure to shut off the circuit breakers to these controls before attempting the modification! Be sure as well to dress the finished leads with electrical tape to prevent short circuits and shock hazard.

So far as the fluorescent ceiling lights, this may be due to improper, third-wire grounding of the lights as well as the presence of a sheet-metal roof which acts like a giant transmitting antenna for the noise!

I'm assuming you are using a conventional AM/FM radio with a built-in loop, so you can't physically connect an outdoor antenna via a coax cable. In this case, I'd recommend a passive, tuned loop antenna like the very popular and very effective Select-A-Tenna, available from Grove Enterprises and some other *MT* advertisers.

First, tune in your favorite station, then reposition the radio for minimum interference and best reception of the desired signal. Then set the loop next to the radio and adjust it to the same frequency, noting a distinct rise in signal strength. Adjust the loop position for best reception on your radio. You should note a substantial improvement in reception.

Questions or tips sent to Ask Bob, c/o *MT* are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of *MT*, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.) The current Ask Bob is now online at our website:

<http://www.monitoringtimes.com>

The Essential Emergency Responder

As promised, this month's column deals with information, radios, frequencies, and the various items we need for being safe at home, on the road, or while responding in the capacity of a volunteer or professional first responder.

What kind of volunteer? Over the years, I have found that most folks interested in volunteering as local firefighters, emergency medical technicians (EMTs), paramedics, Community Emergency Response Teams (CERT), or Radio Emergency Associated Communication Teams (REACT) members, etc., are quite naturally interested in radios. They want the ability to listen so they know what is going on, as well as have the ability to communicate with their agency or team.

Know the Drill

With the ever-growing bonds between these radio groups, emergency agencies, and the federal Department of Homeland Security, there seem to be many more drills and exercises. It is important that those of us who are first responders participate in these exercises, even if it means taking the day off from work. Some drills run two or even three days which simulates a real event which often takes 24-72 hours to be brought under control. As first responders, we need to practice shift rotations and location flexibility.

Here in Spokane, we recently held a drill that involved the military (Air Force and Air National Guard), Washington State Department of Emergency Management, local fire departments, local ambulance service (AMR), local Department of Emergency Management, American Red Cross, several hospitals, Spokane Metro Bus Transit, and of course the Amateur Radio Emergency Service/Radio Amateur Civil Emergency Service (ARES/RACES) hams.

Operation "Ultimate Caduceus" was a region-wide drill. The scenario was an incoming overseas Air Force plane with about 80 "patients" that needed to be decontaminated and then triaged for transport to local hospitals. The Air Force plane landed at Spokane International Airport and taxied to the Air National Guard complex. Security was tight! The real federal Disaster Medical Assistance Team (DMAT) group from Seattle had flown in earlier on a C-17 with several pallets of supplies. They were joined by some federal US Army Reserve members who seemed to be there mostly for logistics support and observation.

Two large military style decontaminated tents had been set up under some extremely windy and cold (36°) conditions. Local volunteers played the role of patients with realistic "injuries," as well as chemical and biological symptoms to be evaluated. Those triaged as

red were immediately transported by ambulance. Green and yellow triaged patients were transported via metro transit buses. In addition to medical staff, a ham operator went on each bus.

Ham operators at the airport kept the hospitals informed as to how many patients were enroute. RACES had operators in the ER rooms at the four major hospitals. The sudden arrival of 20 or more patients put a strain on the local hospitals, but they seemed well prepared and staffed. Several distant hospitals which did not actually receive any patients still had a ham operator present to test the radio communications aspect of patient transportation. RACES operators also maintained cross state contact with the Washington State Department of Emergency Management via HF.

The eight hour exercise went very well; frankly, I could not find a single flaw in the system. Everyone, including, the hams, did a great job, and I should add that a great net control operator, Gordon WA7LNC, was pivotal to our success.

If you are an Emergency Coordinator (EC) for RACES or other group, you can email me for my entire (and lengthy!) evaluation. (I may regret that offer!)

Training is an important foundation of preparedness. I have often mentioned the FREE on-line courses at the Federal Emergency Management Agency (FEMA) website for their Emergency Management Institute. They have improved several classes, and added many NEW courses. Please go to <http://www.training.fema.gov/emiweb/IS/crslist.asp>. In particular, look at classes IS 195, IS 200 and IS 700. Additional training for amateur radio operators can be found at <http://www.arrl.org/cce>.

Let me be very clear about the topic of communicating with official agencies or groups. Obviously, to be a member of ARES or RACES, you need to be a Federal Communications Commission (FCC) licensed ham radio operator. It is not that hard to get your license. You can purchase a booklet with ALL the questions, and ALL the answers from <http://www.mfjenterprises.com/products.php?prodid=MFJ-3211>. If you belong to some other group of responders, they will have their own policies and procedures for radio communications.

Listening In

Of course, anyone can listen to these radio communications to keep informed as to the nature of the event and how agencies are responding.

What frequencies? Naturally, the usual police, fire, and EMS frequencies. Hams primarily use the ham band between 144 and 148 MHz, but they could also be on 440 MHz or on HF for long range communications. In Washington state,

Bright Ideas

Gary Webbenhurst

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check the frequencies around 3.975 MHz. There are many other HF frequencies used. Some are ham and others are Federal government. Sorry, but I not at liberty to disclose those.

The American Red Cross can always be found on their nationwide lowband frequency of 47.420 MHz. Local Search and Rescue (SAR) can be heard on 155.160 and on the adjoining 155 MHz frequencies. The federal Urban Search and Rescue (USAR) use frequencies in the 400-420 range. Ditto for the DMAT. They share several common channels. Read the back issues of *MT* for information on these frequencies, or watch the *Milcom* column by Larry Van Horn or the *Fed Files* column by Chris Parris for future listings.

Being There

It has been my personal policy not to bring a camera to disasters or exercises. For one thing, I am not there to be a photographer, unless I am given that as a specific assignment. After 9/11 everyone seems to be suspicious of anyone taking pictures.

I also hesitate to drag my \$1,000 digital camera and accessories around. I already am burdened with radio and other personal equipment. But I just purchased a Motorola wireless phone model V551 which can take pictures. I can send them to an e-mail address for a quarter, or simply download them to my PC via USB cable. I see great possibilities for using this relatively simple technology for sending back a visual image of damage assessment or current operations to my supervisors, ICP, or EOC.

I am of the very strong opinion that radio volunteers need to carry proper identification, equipment, and be dressed appropriately. I highly recommend a specialty vest to carry your equipment and look professional. Here are three sources of such vests: Ruby J's Custom Sewing at 866-677-3909 (Pacific Standard Time) – 8 colors available and they are very customizable for around \$53. Cops 911 at <http://cops911.com/amateurRadiovest.asp> – top of the line vests but rather expensive. Barker Specialty Co at <https://www.barkerspecialty.com/arrlnew/> (27 Realty Drive, Cheshire, CT 06410: 1-800-227-5372) – the cheaper alternative. Also check for other ARRL apparel with the mandatory ANSI reflective strips.

For carrying your equipment, check out these Go Bag websites:

<http://www.thegallos.com/gobag.htm>
<http://gcares.febo.com/jumpkit.htm>
<http://www.duvalares.net/jumpkit.htm>
http://www.emcomm.org/gear_list.htm

Well, this started out to be an introductory paragraph and grew to become the entire column. Not my usual format, but I trust the information was valuable. Next month I will finish this preparedness topic with more specific information on radios, go-bags, and training. Keep listening!

California Scanning

The ability for public safety agencies to communicate with each other remains a challenge for many organizations. This month we take a look at how a California town upgraded their radio network to interoperate with surrounding communities. We'll also review a Michigan scanner law and highlight some unique features of two new scanners.

Davis, California

The city of Davis, California, is in the process of replacing their 1950s-era VHF radio system. Police and firefighters have long complained about "dead spots" where their radios cannot communicate with each other or with dispatchers. The antiquated system also made it difficult to work effectively with other public safety agencies equipped with more modern equipment.

The city is located in the Central Valley of Northern California in Yolo County, a dozen miles west of the state capitol of Sacramento. Davis has more than 62,000 residents and is home to the University of California at Davis (UCD), which has 26,000 students on a 5,200-acre campus.

In January of last year the city received a \$400,000 federal grant that partially funded a new radio system, and the city council approved a funding plan to cover the remainder of the \$2.4 million cost. As of March 2005, a new Motorola 800 MHz trunked radio system is now operational.

Besides better coverage in trouble spots like the Yolo Causeway, the new radio system will allow interoperability with other Motorola 800 MHz systems in West Sacramento, UCD, and other Central Valley counties and municipalities.

The Federal Communications Commission (FCC) license database lists four repeater output frequencies for the new system: 866.6125, 867.0750, 867.5875 and 868.2125 MHz. An additional channel, 858.2375 MHz, was previously used for Mobile Data Terminals but may be reassigned as part of the new system. All of these frequencies are transmitted from an antenna at Police Headquarters on 5th Street in Davis.

Voice traffic is primarily analog, although some activity may be APCO 25 digital. Here are a few talkgroups reported to be active:

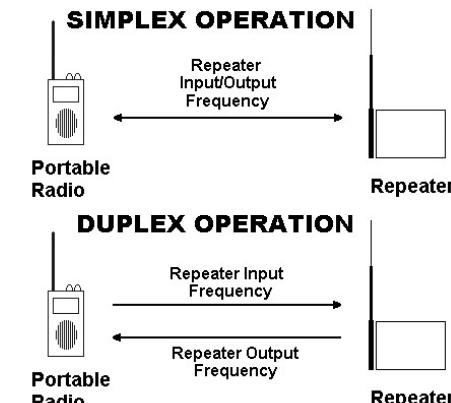
Decimal	Hex	Description
31568	7B5	Fire Dispatch (secondary)
43760	AAF	Fire Prevention
43856	AB5	Fire Training
44208	ACB	Police Tactical 2
44240	ACD	Police Dispatch (primary)

44272	ACF	Police Dispatch (secondary)
44304	AD1	Police Tactical 1
44368	AD5	Fire Dispatch (primary, simulcast on 154.370 MHz)
44400	AD7	Fireground 1
44432	AD9	Fireground 2
44464	ADB	Mutual Aid 1
44496	ADD	Mutual Aid 2

While the transition to the new radio system is underway, you may continue to hear activity on the old VHF frequencies. Smaller nearby towns, such as Dixon and Woodland, will continue to use the older equipment as well as work with Davis on those frequencies.

Davis Police were dispatching through a repeater that transmitted on 159.090 MHz. The repeater received transmissions from the field on 154.875 MHz. This two-frequency operation is referred to as *duplex*. A single frequency of 155.535 MHz was used as a secondary dispatch channel, where the dispatcher and units in the field all took turns transmitting and receiving on it. This type of shared one-channel operation is known as *simplex*.

Davis Fire will continue to use 154.370 MHz as a simplex dispatch channel. The town of Dixon is reported to use 155.085 MHz for Police and 154.085 MHz for Fire activity. Woodland Police can be found on 155.055, 154.535 and 154.770 MHz, and Woodland Fire on 160.065, 153.830 and 158.835 MHz.



In the Davis area the Yolo County Sheriff can be heard simplex on 155.850 MHz. County Mutual Aid can be heard duplex on 154.445, with input to the repeater on 159.525 MHz.

Davis Public Works has a duplex repeater operation, transmitting on 155.145 MHz and receiving on 156.015 MHz.

University of California at Davis

The Regents of the University of California are licensed to operate 800 MHz trunked radio systems on campuses across the state. At UC Davis, an analog Motorola *simulcast* system simultaneously broadcasts from two repeater locations. One location is in Yolo County, on the Main Campus about a mile from the UCD airport. The other site is located at the UC Davis Medical Center on Stockton Boulevard in Sacramento.

The University has a requirement that there be adequate signal on each floor of campus buildings. If necessary, in-building repeaters or other signal aids are installed to ensure adequate signal strength.

Frequencies in use are 866.4875, 866.9875, 867.4875, 867.7125, 867.9875, 868.4875 and 868.6000 MHz.

Decimal	Hex	Description
80005	Police Dispatch	
368	017	Police
496	01F	Campus Safety Escorts
528	021	Student Patrols
880	037	Security
1712	06B	Buses
1744	06D	Buses
2256	08D	Security
2288	08F	Transportation
2376	094	Campus Maintenance
2416	097	Transportation



Sacramento, California

The city of Sacramento, California, operates their own Motorola 800 MHz trunked radio system with three repeater sites, located at the City Jail (Central), Brighton Heights (Southeast) and the Freeport Reservoir Tank (South). The system uses these frequencies: 866.0500, 866.2500, 866.4000, 866.5875, 866.7125, 866.7750, 867.0500, 867.1250, 867.3125, 867.3750, 867.4625, 867.6500, 867.8125, 867.8750, 867.9000, 868.1125, 868.1875, 868.2625, 868.3375, 868.5750, 868.6375, 868.6625, 868.8250 and 868.9000 MHz.

Decimal	Hex	Description
16001	Police Announcements	
48003	Police (Central)	
80005	Police (South)	
112	007	Police (East)
144	009	Police (North)

176	00B	Police (Car-to-Car)
208	00D	Detectives 1
240	00F	Detectives 2
272	011	Records
304	013	Tactical 1
336	015	Tactical 2
368	017	Tactical 3
400	019	Tactical 4
432	01B	Tactical 5
464	01D	Tactical 6
496	01F	Tactical 7
528	021	Announcements
560	023	Administration
592	025	Training
624	027	Training
656	029	Narcotics 1
688	02B	Narcotics 2
1232	04D	Flood Control
1968	07B	Animal Control
2128	085	Parking Enforcement
7472	1D3	Park Service

The city of West Sacramento has a dedicated set of talkgroups on the system:

Decimal Hex Description

13328	341	Fire Announcements
13360	343	Fire Dispatch (simulcast on 154.445 MHz)
13392	345	Fire Administration
13424	347	Fire Tactical 1
13456	349	Fire Tactical 2
13488	34B	Fire Tactical 3
13520	34D	Fire Tactical 4
13552	34F	Fire Tactical 5
13584	351	Fire Mutual Aid 1
13616	353	Fire Mutual Aid 2
13648	355	Fire Mutual Aid 3
13680	357	Fire Mutual Aid 4
13712	359	Fire Training
13744	35B	Fire Dispatch Training
13840	361	Police Announce
13872	363	Police 1 Dispatch (Main)
13904	365	Police 2 Dispatch (Secondary)
13936	367	Police 3 Records
13968	369	Police 4 Administration
14000	36B	Police Tactical 1
14032	36D	Police Tactical 2
14064	36F	Police Tactical 3
14096	371	Police Tactical 4
14128	373	Police Tactical 5
14160	375	Police Tactical 6
14192	377	Police Tactical 7
14224	379	Police Detectives
14256	37B	Police Detectives 1
14288	37D	Police Detectives 2
14320	37F	Police Training
14384	383	Public Works

Sacramento County, California

To the east of Yolo County lies Sacramento County, spanning nearly 1,000 square miles of the Central Valley. Within the county there are nine paramedic service providers and two air ambulance services delivering emergency care. In 2003 there were about 96,000 call-outs for 911 service, dispatched through the Sacramento Regional Fire/EMS Communications Center.

The County operates an analog Motorola trunked radio system on the following frequencies: 866.1125, 866.1375, 866.3500, 866.3750, 866.4375, 866.6375, 866.7500, 866.8125, 866.8375, 867.1000, 867.1625, 867.3500, 867.4125, 867.4375, 867.6875, 867.8375, 867.9375, 868.1375, 868.2375, 868.2875, 868.4375, 868.5375, 868.7375, 868.9375 and 868.9625 MHz.

Three repeater sites provide coverage for the

county, one on Carpenter Peak in Folsom, one on River Road in Walnut Grove, and four in Sacramento (Bond Road, Gibson Ranch County Park, I Street and Freeport Boulevard).

Decimal	Hex	Description
2576	0A1	County Fire Announcements
2608	0A3	County Fire Dispatch (simulcast on 154.190 MHz)
2640	0A5	County Fire (North)
2672	0A7	County Fire (South)
2992	0B8	County Fire (Administrative)
3024	0BD	County Fire (Prevention)
3056	0BF	County Fire (Arson)
3088	0C1	City Fire Announcements
3120	0C3	City Fire Dispatch (simulcast on 153.890 MHz)
3600	0E1	County Fire Announcements (Training)
3632	0E3	County Fire Dispatch (Training)
5136	141	Medical Announcements
5168	143	Hospital (Command)
5200	145	Hospital (Tactical)
5232	147	Hospital (Kaiser North)
5264	149	Hospital (Kaiser Roseville)
5296	14B	Hospital (Kaiser South)
5328	14D	Hospital (American River)
5360	14F	Hospital (Mercy General)
5392	151	Hospital (Mercy Folsom)
5424	153	Hospital (Methodist)
5456	155	Hospital (Mercy San Juan)
5488	157	Hospital (Sutter Roseville)
5520	159	Hospital (Sutter General)
5552	15B	Hospital (Sutter Memorial)
5584	15D	Hospital (University Medical Center)
5616	15F	Hospital (University Medical Center)
8208	201	Sheriff (North and Central)
8240	203	Sheriff (Northeast)
8272	205	Sheriff (South and Central)
8304	207	Sheriff (East)
8336	209	Sheriff Records
8368	20B	Sheriff (Airport)
8400	20D	Sheriff (Juvenile Offenders)
8432	20F	Sheriff (Car-to-Car)
8464	211	Sheriff (Offender Work Release)
8720	221	Detectives (Main)
8752	223	Detectives (North)
8784	225	Detectives (South)
8816	227	Detectives (Warrant Service)
8976	231	Sheriff (Narcotics)
9008	233	Sheriff (Narcotics)
9072	237	Sheriff (Special Operations)
9104	239	Sheriff (Special Operations)
9136	23B	Sheriff (Special Operations)
9168	23D	Sheriff (Special Operations)
9200	23F	Sheriff (Special Operations)
9232	241	Sheriff (Tactical, North)
9264	243	Sheriff (Tactical, East)
9296	245	Sheriff (Tactical, South)
9328	247	Sheriff (Tactical, Southeast)
10320	285	Sacramento Executive Airport
10448	28D	Sacramento International Airport (Shuttles)
10480	28F	Sacramento International Airport (Shuttles)
10512	291	Sacramento International Airport (Ground Operations)
10704	29D	Sacramento International Airport (Control)
11312	2C3	Regional Transit Buses
11408	2C9	Regional Transit Light Rail (North)
11504	2CF	Regional Transit Light Rail (South)
11536	2D1	Regional Transit Police
11600	2D5	Regional Transit Police (Tactical)
12336	303	Folsom Police Dispatch
12368	305	Folsom Police Records
12400	307	Folsom Police (Tactical 1)
12432	309	Folsom Police (Tactical 2)
12464	30B	Folsom Police (Tactical 3)
12496	30D	Folsom Fire
12528	30F	Folsom Fire (Tactical)
21040	523	County Animal Control
21072	525	County Animal Control (Tactical)
24112	5E3	County Coroner
27216	6A5	Freeway Service Patrol (Towing)
27248	6A7	Freeway Service Patrol

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❖ Michigan Scanner Permit

Hi Dan,

I read your website concerning the vehicle permit for scanner use in Michigan. When I read the part about them expiring after three years I was somewhat alarmed, because I have had this permit in Michigan for well over three years and was unaware of an expiration issue.

Today after work I stopped in at the Flint Michigan State Police (MSP) Post 35 and presented my permit to the desk officer with the question concerning expiration. He contacted MSP Communications Division (in my presence) by phone and their reply was that the older permits did indeed have an expiration date on the permit, but that the newer ones do not, and do not expire.

He did mention that they were "cracking down on those," I assume he meant mobile scanner use. He and the three other troopers there acted like they had never seen one of these permits, but they all recognized the MSP Director's signature on it. Thought that was interesting.

Just thought I'd pass this information along to you. I enjoyed your website.

Les in Davison, Michigan

If you're planning on driving in Michigan this summer, you should be aware of the state law regarding scanners in your vehicle. In Michigan it is illegal to have a scanner ("a radio receiving set that will receive signals sent on frequencies assigned... for police purposes") unless you meet one of the following criteria:

You are a "peace officer"

You hold an amateur radio license of technician class or better, or

You have a permit issued by the state police.

The actual law is set out in Michigan Compiled Law section 750.508:

VEHICLES EQUIPPED WITH SHORT WAVE LENGTH RADIO RECEIVING SETS

Sec. 508. (1) Any person who shall equip a vehicle with a radio receiving set that will receive signals sent on frequencies assigned by the Federal Communications Commission of the United States of America for police purposes, or use the same in this state unless such vehicle is used or owned by a peace officer or a bona fide amateur radio operator holding a technician class, general, advanced, or extra class amateur license issued by the federal communications commission, without first securing a permit to do so from the director of the department of state police upon application as he or she may prescribe, shall be guilty of a misdemeanor, punishable by imprisonment in the county jail for not more than 1 year, or by a fine of not more than \$500.00, or by both fine and imprisonment

CD-4 (7-96)

MICHIGAN STATE POLICE

PERMIT FOR USE OF SHORT WAVE RECEIVER IN VEHICLE

According to Section 750.508, MCL of 1970, as amended, this authorizes

SAMPLE

to operate a vehicle with a short wave radio receiver on radio frequencies licensed for police use, except those frequencies licensed for police radar.

[Signature]
Director

in the discretion of the court.

(2) This section shall not be construed as restricting the use of radar detectors.

Although I am not a resident of Michigan I do travel there quite often, so I applied for a permit in November of 2003. About a month later I received a credit card-sized permit with my name and address on it. As Les indicates, the newer permits (like mine) do not have an expiration date.

I find it interesting as well that the Michigan State Police troopers did not recognize the permit. It would be prudent when driving in Michigan with a scanner to have either the permit or a copy of your amateur radio license with you, along with a copy of the Michigan law. Should you attract the attention of a police officer, you can at least hope to educate him or her regarding your radio equipment.



In March of this year Representative Elsenheimer introduced House Bill 4544 to the Michigan Legislature, which would change Michigan's scanner law to read:

Sec. 508. (1) A person shall not commit or attempt to commit a crime while in possession of a radio receiving set that receives signals sent on frequencies assigned by the Federal Communications Commission of the United States of America for public safety purposes.

(2) A person who violates subsection (1) is guilty of a misdemeanor, punishable by imprisonment for not more than 1 year or a fine of not more than \$1,000.00, or both.

(3) This section does not apply to the use of radar detectors.

(4) A term of imprisonment imposed for violating subsection (1) may be imposed to run consecutively to any other sentence imposed for another violation arising from the same transaction.

This would seem to be a more reasonable law, making possession legal except while engaging in criminal behavior. As of this writing the bill has simply been introduced and is in the Committee on Judiciary. It has not been voted on by the legislature nor signed by the governor, so as of now it remains illegal to have a police scanner in your car unless you meet one of the three criteria listed above.

I have more details about Michigan's scanner law, along with a link to a permit application form, on my web site at <http://www.signalharbor.com/michigan.html>

❖ New Scanners

A couple of new trunk-tracking scanners have hit the market recently with some interesting new features.

The PRO-97 is a handheld scanner sold through Radio Shack that can trunk-track Motorola, EDACS (Enhanced Digital Access Communication System) and LTR (Logic Trunked Radio) as well as scan conventional systems. It has 1000-channel memory and an "ID tagging" feature that lets you assign a name to each frequency for easy identification.

The PRO-2051 is a desktop or mobile scanner that can also scan the "big three" trunked radio systems and has the same "ID tagging" feature.

Perhaps the most interesting feature of these



scanners is "Signal Stalker," which automatically locates nearby transmissions without the operator having to enter a frequency. I've used an Optoelectronics Scout Frequency Recorder for several years, which captures and displays nearby active frequencies. The Signal Stalker operates in a similar manner, allowing the operator to "sweep" a range of frequencies for activity. If an active frequency is found, it will be displayed and the scanner will automatically tune to that frequency. Frequency ranges can be locked out to avoid tuning to unwanted signals. Radio Shack claims that Signal Stalker is more sensitive than handheld frequency counters and can detect activity at greater distances, up to 1,000 feet away.

The scanners also have a number of pre-programmed search bands, including Marine, CB, Police/Fire, Aircraft, and Amateur (Ham) Radio. These searches allow the operator to easily check for activity in specific areas.

Both scanners have a "Skywarn" feature that allows the operator to quickly monitor amateur radio repeaters designated to carry severe weather observation reports. Skywarn reports typically appear on official NOAA (National Oceanic and Atmospheric Administration) broadcasts as well as television and radio, so listening to Skywarn may give the operator an early indication of dangerous weather activity.

The PRO-97 can be powered from ordinary AA-size batteries, avoiding the use of a proprietary (and expensive) battery pack. It can also use rechargeable batteries or an AC/DC power adapter.

Each scanner has identical frequency coverage, namely 25-54, 108-136.9875, 137-174, 216.0025-221.9975, 222-225, 225.025-405.975, 406-512, 806-960 (excluding cellular) and 1240-1300MHz.

PC interfacing and frequency cloning are features common to both units.

Although these scanners will cover the Military Air band and can trunk-track LTR systems, features which are missing on many scanners, neither will follow nor decode any digital systems. So, if you're looking to monitor APCO Project 25 systems the PRO-97 and PRO-2051 will not be of much use. However, if you want to quickly locate nearby activity as well as track analog trunked systems, either of these scanners might be just what you're looking for.

That's all for this month. More scanner information, links and frequencies can be found on my web site at <http://www.signalharbor.com>. I also welcome your questions, comments and activity reports via electronic mail to danveeneman@monitoringtimes.com. Until next time, happy scanning!



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The Bearcat 895XLT is superb for intercepting trunked analog communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include Auto Store - Automatically stores all active frequencies within the specified bank(s). Auto Recording - Lets you record channel activity from the scanner onto a tape recorder. CTCSS Tone Board (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning pleasure, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; **PS002** DC power cord - enables permanent operation from your vehicle fuse box \$14.95; **MB001** Mobile mounting bracket \$14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. **CAT895** Computer serial cable \$29.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.



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Mfg. suggested list price \$429.95/CEI price \$189.95

300 Channels • 10 banks • Trunk Scan and Scan Lists

Trunk Lockout • Trunk Delay • Cloning Capability

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MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

Our Bearcat TrunkTracker BC245XLT is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS® analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as Multi-Track - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. 300 Channels - Program one frequency into each channel. 12 Bands, 10 Banks - Includes

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Oddities: Is Short Wave Haunted?

Anyone else notice all the funny noises on short wave radio lately? It sounds like one of those creepy movies they show every year at Halloween, with plenty of creaks, moans, howls, and things that go bump in the night. The "oddities" – as unexplained weird signals are called – seem to be multiplying faster than insects in spring.

❖ The Squeaky Wheel Talks

Big news for "numbers" fans came when an especially bizarre-sounding oddity called "The Squeaky Wheel" suddenly turned into a female voice giving a callup and short message in Russian.

The Squeaky Wheel appeared in 2000, eventually settling down on or just above 3828.0 kilohertz (kHz). Like all these stations, it was given a humorous name from the sound it made, which is most definitely that of a bicycle wheel in very bad need of lubrication. Modulation type appeared to be some kind of audio frequency-shift keying, but with a predictable warble in the lower tone, and some tiny shifts in the high one.

It didn't take long to determine from propagation that the source was probably Russia, and therefore probably legal in this band. Best guess was that we had yet another of those funny-sounding channel markers the Russians love to put up, like The Pip and The Buzzer.

Nothing could be proven, though, until last March. That's when a British listener discovered the female voice, with a typically cryptic "numbers" message in upper sideband (USB). She has been heard several days since, always between 1800 and 1900 Coordinated Universal Time (UTC), always with four trigrams. The first of these 3-number groups is clearly a callup. The remaining three are the message, or lack thereof. The whole thing is repeated three times. No other procedures are heard.

❖ A Night at the Races

A newer oddity was the steady, buzzing noise that was quickly named The Race Car. It was heard worldwide for a few weeks in late winter, fading in and out with the skip on 6249.0 and 13237.0 kHz. While it sounded like a simple pulse, spectrograms indicated a series of overlapping, rapid frequency sweeps. The whole thing really did sound a lot like the car races, thanks to ionospheric phase distortion, though the engines weren't quite hitting on all cylinders.

Another channel marker? Seems likely,

although theories on this one varied all the way from radar to a malfunctioning television broadcast transmitter. Spectrograms, however, seemed to reveal strings of frequency-shift-keyed characters, on a higher audio band just above the car noise. Was this just interference from another station, or the real content?

The mystery deepened when The Slot Machine – a really weird noise from a Japanese government radio system – turned up nearby. Skip indicated a Pacific origin for the Race Car, too. However, it hasn't been heard in a while, so we'll just have to wait.

❖ Yosemite Sam

This especially bizarre transmission was discovered last December, on 3700 kHz double sideband (DSB). It quickly turned up on 4300, 6500, and 10500 kHz, as well. These frequencies were on a 40-second rotation, with short beacon transmissions on the next one up (or back to start) every 10 seconds, like clockwork. Strong signals were heard worldwide.

Each transmission had a tone burst unlike anything else ever heard. It was quickly followed by a well-known cartoon voice that was most definitely Yosemite Sam threatening to blow Bugs Bunny to "smitherenes." This was quickly identified as half a sound clip from a public Web site. Presumably, the same computer was being used to make the sounds and control the radio.

Since it was Christmas, a holiday prank was suspected. Not quite as amused were the US amateur intruder watchers, who guard their valuable spectrum like junkyard dogs. When the Internet carried word of a suspected origin just west of Albuquerque, NM, Sam immediately vanished.

Was that all, folks? No way. Sam reappeared on January 15, this time with just the buzz and word "Varmint," on 5000, 10000, 15000, and 20000 kHz. Yes, right under the WWV standard time/frequency station just to the north in Colorado. Talk about wanting to get noticed! Then, on February 9, Sam returned to the original four frequencies.

The hams went back to work, chasing the transmitter by car. They drove right up to a government and military contract facility on New Mexico's Laguna Pueblo Indian Reservation. It's called MATIC, which is an acronym for Mobility Assessment Test and Integration Center.

MATIC's name describes its work perfectly. It offers a wide-open range with varied terrain, used for testing advanced military radios. Radios which would, presumably, need computer control, flexibil-

ity, and instant frequency agility, and which would most likely trade data bursts like Sam's weird buzz. In other words, just what we'd been hearing!

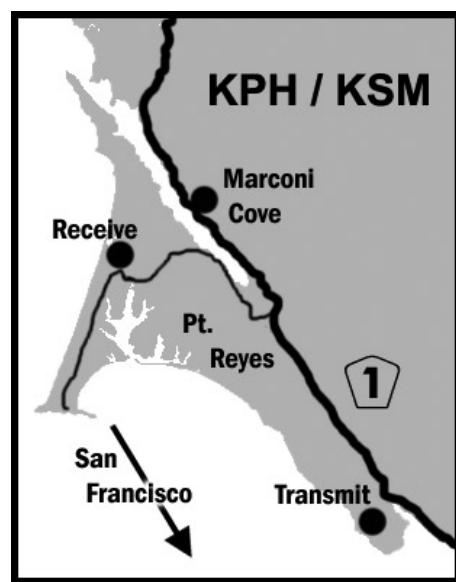
Sam vanished again, right after someone shooed the hams away from a MATIC building. Again, though, the station came back, this time in March, with the same buzz and a new, somewhat garbled, voice. It is still coming and going, last spotted on 1770 and 3890 kHz. Perhaps those responsible have a better reason than just a hobby radio joke. Could it be that all of this is a direction-finding exercise for someone other than the hams? This story is far from over.

❖ Commercial Morse Lives!

California's Maritime Radio Historical Society, which operates the partially restored KPH coastal station north of San Francisco, has just been granted the first FCC class 1A commercial maritime telegraphy license in decades. The callsign is KSM. Testing has already begun at the KPH site. Vintage equipment is used, and operators need the old FCC radiotelegraphy license.

While they don't expect much business, the station will be completely capable of taking commercial Morse code messages from ships, not to mention the required, cost-free relay of weather observations and positions. Initial frequencies will be 426, 500, 6474 and 12993 kHz, all 5000 watts.

Also, don't forget July's annual "Night of Nights" special event operation at KPH/KSM. See you next month.



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ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
AFRTS	Armed Forces Radio and TV Services
ALE	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat Request teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
DSB	Double-Sideband suppressed-carrier telephony
DSC	Digital Selective Calling
E3a.....	UK MI6/SIS, musical callup, probably Cyprus
EAM.....	Emergency Action Message
FBI	US Federal Bureau of Investigation
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction teleprinting system
HFDL	High-Frequency Data Link
HF-GCS	High-Frequency Global Communications System
M8a.....	Cuban CW "numbers" cut to ANDUWRIGMT
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
MSI	Maritime Safety Information
Navtex	Navigational Telex
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA.....	Republic of South Africa
RTTY	Radio Teletype
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B.....	Simplex Teleprinting Over Radio, FEC mode
UK	United Kingdom
Unid	Unidentified
US	United States
V2a.....	Cuban Spanish female "Atencion" numbers

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

421.2	UGC-St Petersburg Radio, Russia, CW marker at 2004. (Day Watson-UK)
518.0	"B"-Bodo Radio, Norway, SITOR-B Navtex at 2326. "V"-Augusta, Italy, at 2330. "X"-Cabo de la Nao, Spain, at 2354. (Patrice Privat-France)
1259.5	EKA-New Shipcom station, Yerevan, Armenia, SITOR-B traffic list and weather, at 1024. (Watson-UK)
1764.0	EAC-Tarifa Radio, Spain, traffic list at 1933. (Privat-France)
2182.0	EAL-Las Palmas Radio, Canary Islands, traffic at 1644 and 1689. (Privat-France)
2598.0	VON-Canadian Coast Guard, St John's, NFD, weather at 0640. (Privat-France)
3292.0	Cuban Spanish "numbers" (V2a), transmitter malfunction sounding more like DSB than AM, at 0200. (Tom Severt-KS)
3890.0	Unid-DSB beacon with the same buzz used by "Yosemite Sam," then garbled voice fragments at 0500. (Joe Tyburczy-CA) [Yes, it's good old Sam's latest strangeness, from west of Albuquerque, NM. Also 1770 kHz. -Hugh]
4207.5	PFOH-Vessel Levantgracht, DSC test call to Lyngby Radio, Denmark, at 2328. (Watson-UK)
4209.5	"P"-Chilung Radio, Taiwan, SITOR-B Navtex at 1830. (Watson-UK)
4218.5	LZW-Varna Radio, Bulgaria, SITOR-B weather in English, then MSI in Bulgarian, at 1836. (Watson-UK)
4369.0	WLO-Mobile Radio, AL, giving MSI schedule at 0205. (Jeff Seale-KY)
4780.0	CGOOPS-Possible US Army, ALE sounding at 0318. (Severt-KS)
5320.0	US Coast Guard Cutter Shearwater, working Group Atlantic City at 2346. (Mark Cleary-SC)
5547.0	Evergreen 6307-Evergreen International Airlines freighter, position for San Francisco at 0404. (Severt-KS)
5616.0	CKS 209-Kalitta Air 747 freighter, working Gander at 0123. Reach
5696.0	833Y-US Air Force Air Mobility Command charter, passing a report to North American Airlines via Gander, at 0147. (Clifford-UK)
5732.0	Coast Guard 2141-US Coast Guard helicopter working CAMSLANT on a search and rescue mission, at 0144. CAMSPAC, working Air Force Rescue 216, at 0259. (Rick Baker-OH) "O-2-D"-US Coast Guard, working CAMSLANT while dropping supplies to stranded migrants, at 2233. (Cleary-SC)
5757.0	Jack Knife-US Customs, FL, secure and clear with 41SK, at 0229. (Cleary-SC)
5800.0	Tusker 313-Canadian Forces CC-130, calling Halifax with no joy, at 0244. (Baker-OH)
5887.7	CHM721-Canadian Forces, Glace Bay, calling CHM723, also 6801.5 and 11132.5, ALE at 0031. (Ron Perron-MD)
6314.0	IMB2-Rome Meteo, RTTY weather at 1929. (Watson-UK)
6494.5	NMF-US Coast Guard, Boston, MA, SITOR-B weather and MSI at 0213. (Seale-KY)
6691.0	CFH-Canadian Forces Meteo, Halifax, NS, RTTY weather at 0140. (Seale-KY)
6694.0	"L-0-Y"-Military, tracking link coordination with patches to Boulmer, UK, at 1015. (Privat-France)
6709.0	Pathfinder 20-Canadian Forces, working Halifax at 1218. (Cleary-SC)
6712.0	NOJ-US Coast Guard, Kodiak, AK, calling J12 in ALE, at 0242. (Cleary-SC)
6715.0	CO0046-Continental Airlines, HFDL position for station 3, Reykjavik, Iceland, at 1003. (Watson-UK)
6721.0	Halifax Military-Canadian Forces, RTTY and voice with Swordfish 17, at 1124. (Cleary-SC)
6721.0	Coast Guard 1500-US Coast Guard, ALE-initiated call to Elizabeth City Ops, at 1927. (Cleary-SC)
6721.0	HIK-Hickham AFB, Hawaii, calling JTY, Yokota, Japan, in ALE at 1714. (Bob Hall-RSA)
6739.0	Navy CW 950-US Navy, patch via Ascension HF-GCS to Norfolk Base Ops, at 2327. (Cleary-SC)
6745.0	Rescue 326-Canadian Forces, sent to 5717 kHz by Trenton, at 0309. (Cleary-SC)
6761.0	UHAUL 99-US Air Force transport, calling tanker Mash 83, answered by Blue 82, at 0100. (Cleary-SC)
6911.5	T4Z101-US Army, KY, working helicopters in ALE, also 9081.5, at 1559. (Perron-MD)
6959.0	Lincolnshire Poacher-UK "numbers" (E3a), Poacher tune and 5-figure groups, parallel 10426, at 2230. (Severt-KS)
7038.7	"D"-Russian Navy CW cluster beacon, Odessa, also 10871.7, at 0713. (Ary Boender-Netherlands)
7038.8	"P"-CW cluster beacon, Kaliningrad, at 0713. (Boender-Netherlands)
7038.9	"S"-CW cluster beacon, Arkhangelsk, also 10871.9, at 0713. (Boender-Netherlands)
7039.0	"C"-CW cluster beacon, Moscow, also 10872, at 0713. (Boender-Netherlands)
7508.0	ZSC-Cape Town Radio, RTTY weather parallel on 13538, at 0956. (Hall-RSA)
7520.0	Cuban AM Spanish female (V2a), 5-figure groups at 0910. (Severt-KS)
7646.0	DDH7-Hamburg Meteo, Germany, RTTY synoptic codes at 1836. (Watson-UK)
7903.5	LR1-FBI, Little Rock AR, calling GM1, Guam, ALE at 0320. (Perron-MD)
8058.6	WNG-US State Department, calling WLU, WNG752, and WNG753, ALE at 1231. (Perron-MD)
8146.1	IMB55-Rome Meteo, FAX charts at 1500. (Watson-UK)
8414.5	S6FD-Vessel Aniara, DSC distress call at 0915, 0927, and 0931. (Watson-UK)
8416.5	NMF-US Coast Guard, Boston, SITOR-B MSI at 0210. (Seale-KY)
8430.0	RRR34-Moscow Radio, SITOR-B traffic list at 1417. (Watson-UK)
8834.0	ZS-SJT-South African Airways flight 679, HFDL position for Johannesburg, at 1525. (Hall-RSA)
8879.0	CRL 914-Corsair International 747, position for Gander at 1848. (Clifford-UK)
8930.0	UAL 923-United Airlines, troubleshooting electrical problems in a patch via Stockholm Radio, Sweden, at 1125. (Clifford-UK)
8942.0	SU290-Aeroflot, HFDL position at 1433. (Watson-UK)
8971.0	Red Talon 71G-US Navy, working Jaguar at 2328. (Cleary-SC)
8977.0	N67157-Continental Airlines, HFDL message at 1441. (Watson-UK)
8983.0	CAMSPAC Point Reyes-US Coast Guard, CA, working Coast Guard 1701, at 1953. (Severt-KS)

8992.0	Offutt-US Air Force HF-GCS, NE, with EAM "for whisky and yankee force," at 1248, then working Andrews Training at 1412. (Jeff Haverlah-TX) "O-6-T"-US Air Force, patch via Andrews HF-GCS to "4-L-X" with Exercise Esteem Highly Alpha message, at 1356. (Cleary-SC)	13092.0	EKA-Yerevan Radio, Armenia, testing at 1516. (Watson-UK)
9007.0	Coast Guard 1503-US Coast Guard HC-130 on International Ice Patrol, working Trenton at 1838. RAF AIR 7493-UK Royal Air Force, working Trenton at 2342. (Cleary-SC)	13101.0	WLO-Mobile Radio, AL, voice synthesized weather and traffic list at 2107. (Severt-KS)
9025.0	Quid 99-US Air Force tanker, ALE-initiated patch to Charleston AFB, regarding refueling of Grits 91, at 2333. (Cleary-SC)	13110.0	WLO-Mobile Radio, AL, MSI and traffic list at 1900. (Severt-KS)
9145.0	RIW-Russian Navy, Moscow, calling RIT81 at 1400. (Watson-UK)	13155.0	Overture-US military, repeated 28-character EAM at 1829, 1841, and 1909. Play Suit-Same operator a week later, two 28-character EAMs at 1940, repeated the first at 2010. (Don Storck-MI)
9251.0	Lincolnshire Poacher-UK female voice with 5-number groups (E3a), parallel 12603, at 2241. (Severt-KS)	13257.0	Navy LL 23-US Navy P-3C, came from 11232 for a patch via Trenton, at 1549. (Cleary-SC)
9330.0	Cuban "Cut Numbers," CW 5-figure groups (M8a), at 0413. (Severt-KS)	13303.0	17-New HFDL station, El Goro, Canary Islands, squittering at 1357. (Watson-UK)
9972.0	PNR400-US DEA, Caribbean, ALE sound at 0047. PANTHR-DEA, Bahamas, ALE sound at 0240. (Watson-UK)	13321.0	ZS-SJN-South African Airways flight 160, HFDL position for Johannesburg, at 0751. (Hall-RSA)
10066.0	LH8409-Lufthansa Airlines, HFDL log on to Hat Yai, Thailand, at 1539. (Watson-UK)	13436.0	Cuban AM "numbers" (V2a), dead carrier at 0100, then started message in the middle at 0114. (Severt-KS)
10100.8	DDK9-Hamburg Meteo, RTTY weather in ship synoptic code, at 1652. (Watson-UK)	13503.6	KWL92-US State Department, calling KWL90, Manila, ALE at 1509. (Perron-MD)
10536.0	CFH-Canadian Forces, Halifax, FAX ice charts at 0015, RTTY weather at 0232. (Seale-KY) CFH, FAX at 1527. (Severt-KS)	13510.0	CFH-Canadian Forces Meteo, Halifax, NS, RTTY weather at 1427, FAX charts at 1540. (Severt-KS)
10666.0	MAS 2-Malaysian Airline System, calling Yangon, Myanmar, at 1710. (Clifford-UK)	13927.0	Reach 325Y-US Air Force Air Mobility Command, patch via MARS AFA1RE, ME, for weather at Mildenhall, UK, at 1302. (Cleary-SC)
10691.5	812189-US Army, AL, calling GRB, probably Ghost Rider Base, KY, ALE at 2040. (Perron-MD)	13945.0	Pack 11-US Air Force Reserve tanker, patch via MARS to Pack Control, NH, at 2050. (Severt-KS)
10714.0	Cuban "Cut Numbers," CW 5-figure groups (M8a), at 0202. (Severt-KS)	13946.7	TUD-Tunisian ALE net, calling STAT1, also 14700, 15635, and 16285, at 1019. (Watson-UK)
11175.0	"M-5-E"-Probable US Air Force, patch via Puerto Rico HF-GCS for an Exercise Esteem Highly Alpha message, at 1401. Andrews-US Air Force HF-GCS, MD, sending Andrews Training to 13247, at 1540. (Haverlah-TX) Unid-Male, making rude noises and saying "No way!" during McClellan Global EAM at 1807. (Severt-KS) Skier 91-NY Air National Guard, patch via Puerto Rico to Schenectady, NY, regarding snow on the runway, at 2152. (Cleary-SC)	13993.0	STAT154-Tunisian government/military net, PACTOR-II traffic for STAT1, at 0945. (Watson-UK)
11205.0	Shark 67-US Joint Task Force, working Smasher, FL, at 1955. (Cleary-SC)	14493.5	AFA4C-US Air Force MARS, calling Ramstein at 1833. (Severt-KS)
11217.0	DHM91-German Air Force, calling "99" at 2202. (Cleary-SC)	14680.0	SE1-FBI, Seattle, WA, calling AN1, Anchorage, AK, ALE at 1703. (Perron-MD)
11232.0	Canforce 4950-Canadian Forces, working Trenton regarding Signonella (Italy) departure at 1201. (Cleary-SC)	14813.0	KNY25-Romanian Embassy, DC, calling CENTR5, Romanian MFA, ALE at 2102. (Perron-MD)
11285.0	QFA 5-Qantas flight working Chennai, India, at 1821. (Clifford-UK)	14996.0	DBFA-Unknown CW station, working DP9D at 1622. (Watson-UK)
11285.0	SIA 324-Singapore Airlines, working Colombo, Sri Lanka, at 1722. (Clifford-UK)	15016.0	RWM-Russian standard time station, Moscow, CW pips at 1652. (Watson-UK)
12119.0	Cuban "Cut Numbers," CW 5-figure groups (M8a), at 0115. (Severt-KS)	15043.0	Milky Way-US military, with a 28-character EAM simulcast on 8992 and 11175, at 2000. (Haverlah-TX)
12133.5	American Forces Network-Probably US Navy, repeating AFRTS satellite, at 1953. (Severt-KS)	15094.0	537987-US Air Force tanker, calling GLOB (Global), ALE at 1807. (Perron-MD)
12215.0	Cuban AM Spanish female voice (V2a), 5-figure groups at 0200. (Severt-KS)	15920.0	NCS009-US National Communications System, calling 444, also 17487, ALE at 2037. (Perron-MD)
12359.0	Southbound II Coastal-"Herb Hilgenberg's Net," Ontario, Canada, passing weather information to many small vessels at 2009. (Severt-KS)	16283.6	CFH-Canadian Forces, Halifax, NS, RTTY marker at 1528. (Watson-UK)
12479.0	Unknown-Vessel working WLO on SITOR-A channel 1206, coast transmitting on 12582, at 1652. (Severt-KS)	16806.5	KRC81-US State Department, calling KRC84, ALE at 1251. (Perron-MD)
12577.0	VRWU4-Vessel Yong Tai, DSC test call to US Coast Guard Miami, FL, at 1958. USCIG Miami, responding in DSC at 2000. (Watson-UK)	16829.5	Unknown, probably US Coast Guard, with MSI at 1710. (Hall-RSA)
12579.0	NRV-US Coast Guard, Guam, SITOR-B weather at 1500. (Watson-UK)	17069.7	UCE-Arkhangelsk Radio, Russia, working unknown vessel in 3-shift Cyrillic SITOR-A, at 1042. (Watson-UK)
12585.0	WLO-Mobile Radio, AL, SITOR-B info and traffic list at 1605. (Severt-KS)	17147.0	JJC-Tokyo Radio, Japan, Kyodo News English FAX newspaper at 1210. (Hall-RSA)
12587.0	LZW-Varna Radio, Bulgaria, SITOR-B news in Bulgarian, at 1008. (Watson-UK)	17441.5	URL-Sevastopol Radio, Ukraine, working vessel Konstructor Koshan in RTTY, at 1716. (Hall-RSA)
12593.5	EKA-Yerevan Radio, Armenia, SITOR-B traffic list and weather, at 1430. (Watson-UK)	17458.5	5YE-Nairobi Meteo, RTTY weather in French and English, at 1722. (Hall-RSA)
12606.0	UIW-Kaliningrad Radio, operator chatter in 3-shift Cyrillic SITOR-A, at 1715. (Watson-UK)	18003.0	A090ZN-Arizona National Guard, calling H090IN, Hawaii, ALE at 1641. (Perron-MD)
12701.0	CKN-Canadian Forces, Matsqui/Esquimalt, BC, RTTY channel availability marker, at 1700. (Severt-KS)	18248.6	NW1-Nightwatch 1, US military airborne command post, calling NW4 (Nightwatch 4), also 15043, ALE at 1506. (Perron-MD)
12840.5	PBC-Danish Navy, Goeree, RTTY channel availability marker at 2303. (Severt-KS)	18571.5	KWK96-US State Department, calling KWK97 and KWK98, also 20810.6, ALE at 1735. (Perron-MD)
12857.0	6WW-French Navy, Dakar, Senegal, RTTY "brick" test loop at 0100. (Severt-KS)	19602.0	S8V-Probably Tunisian diplomatic, FEC no-traffic marker at 1000. (Hall-RSA)
13089.0	NMN-US Coast Guard CAMSLANT Chesapeake, weather at 1737. (Severt-KS)	19814.0	AAA-Israeli Air Force, ALE-initiated Hebrew voice contact with M75, at 1625. (Perron-MD)
		20503.0	037RMRCAP-Civil Air Patrol, Rocky Mountain Region, ALE sounding at 2045. (Perron-MD)
		20810.6	KWK-US State Department, calling WNG746, ALE at 1742. (Perron-MD)
		21955.0	17-HFDL ground station, El Goro, working N67052, at 1405. (Watson-UK)
		21982.0	SU0220-Aeroflot flight, HFDL position at 1021. (Watson-UK)
		22389.5	NMN-US Coast Guard CAMSLANT, VA, CW identifier in SITOR-A calling marker, at 1657. (Watson-UK)

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Co-ordinate or Get Covered!

Argentina's shortwave stations should have learned a lesson by now, since two of their long-time frequencies were covered by other stations from March 27, the beginning of the A-05 season. Argentina was not represented at February's High-Frequency Coördinating Committee meeting, held in Mexico City. As a result, other stations moved in on their frequencies. Whether these stations, HCJB and Voz Cristiana, were aware of Argentina's usage is open to question. The prevailing attitude at HFCC seems to be: if it's not on their schedule, it doesn't exist. Actual monitoring or, heaven forbid, consulting *Monitoring Times* or DX publications, is not an option.

Specifically, to accommodate Bulgaria, between 2100 and 0100 UT, HCJB moved from 11700 to 11710 – where Argentina has been for as long as we can remember. We can only imagine the collision during the first part of this period, when both are broadcasting to South America. During the latter part, HCJB also beams to North America and RAE is nothing but an off-frequency heterodyne here at best.

Some stations are frequency-agile and others are not. Those who are not are at a disadvantage. Being stuck on one frequency no matter what is a result of several factors, such as a domestic-broadcasting mentality where each station has one fixed frequency, and of transmitters which are designed for one frequency and not easily changed even if desired. Since stations exist to be heard by listeners, it is the listeners who are the ultimate losers in this game, as long as stations cannot get their acts together (or rather, apart!).

The Argentine stations are apparently so out-of-contact, that we decided to try to resolve these conflicts. Once aware of the problem (after all, it degrades their reception, too), HCJB was amenable to making a change and was looking for another frequency, but none had been found by presstime.

The other case is less balanced: a 100-kW multiple-frequency international broadcaster (Voz Crista from Santiago, Chile) vs. a low-power quasi-domestic station, but one which is the only voice from its entire

continent on the SW broadcasting bands (LRA-36, Radio Nacional Arcángel San Gabriel, Base Esperanza, Antarctica). Until this season VC had used 15475 during part of the day, but not before 2100 UT, which happens to be the end of LRA-36's 3-hour daily broadcast on 15476. Sometimes there was a brief overlap, but everyone was happy.

Now, VC suddenly expanded that usage to 12 hours a day, 1200-2400 UT, blanketing LRA-36's broadcast. At first, excuses were made that there was no collision, since VC is targeting Brazil and LRA-36 is not. Unfortunately, SW signals are not so confinable! VC is probably capable of overpowering LRA-36 in Brazil, where the latter may be no more than a heterodyne. But except for a skip zone around Santiago, LRA-36 is likely to be totally blocked by VC all over South America and the rest of the world where it used to be possible to hear LRA-36. It had been reported from North America, Europe and Japan, although certainly as a rather rare catch.

An even greater problem from VC's point of view is Africa Number One, Gabon, which also uses 15475, currently at 1600-1900 for NW Africa. These two produce a big collision both in South America and Africa (and North America, too, as we have monitored). Yet VC stuck to 15475 and did not reply to our notification of these conflicts. The higher bands are not so crowded that all these stations could not each be on a clear frequency of its own. All it takes is the flexibility and professionalism to make the necessary changes so everybody wins.

HFCC A05

For what it's worth, the incomplete HFCC A-05 frequency schedule is at: <http://www.hfcc.org/data/index.html>

EiBi A-05 Schedules

These are more complete, and compiled separately by Eike Bierwirth, both in time and frequency order. The time version for A-05: <http://www.susi-und-strolch.de/eibi/bc-a05.txt>

AFGHANISTAN [non] Surrogate services, A-05 via VT Communications, in Dari/Pashto: Internews / Salaam Watandar: 0230-0400 15240, Samara, Russia, 250 kW, 140 degrees; 1300-1430 15500 Rampisham, UK, 500 kW, 95 degrees. Radio Solh/Radio Peace: 1200-1800 17700 Rampisham 500 kW, 85 degrees (Observer, Bulgaria) 17700 comes in well here off the back, enjoyable music (gh, OK)

ALASKA By mid-April, KNLS on its English website was finally showing the old one-transmitter schedule as current, including English at 0800 on 11870, 1300 on 9615; but on its Chinese and Russian pages a different two-transmitter schedule with some additional English: 0800 11870, 1000 9795, 1200 9615 9780, NOT at 1300, 1400 on 9795. Tnx to Eric Zhou for pointing out the Chinese version (legible in English) (gh)

ARMENIA Public Radio of Armenia on new 9775 including English 1825-1845, also 4810, not on announced 11640 (Mike Barraclough, UK, DX Listening Digest)

BANGLADESH Bangladesh Betar, 7185, has been making it to NAM better than before at 1230-1300; includes mailbag show on 2nd and 4th Fridays, *From You to Us* (Richard Read via Mike Barraclough, World DX Club Contact)

BOLIVIA Radio Virgen de Remedios, Tupiza, Potosí, was heard very well between 2000 and 2400 with good audio quality, but SSB interference, on 9193; another day at 1200 they had gone down to 9187 (Adán Mur, Paraguay, *Conexión Digital*) Last June-July this was heard testing on 5500 and 5945 (LA-DX) Later it drifted up to 9207-9228, good signal and audio with relays of WEWN (Alfredo Locatelli, Uruguay, *Conexión Digital*) unID only with music on 9223 2245-2251* April 15 (Jan Edh, Sweden, SW Bulletin)

BRAZIL Radiodifusora Roraima active again in April, varied around 4876.34; one of my favorite Brazilians (Adán González, Venezuela, DXLD)

BULGARIA R. Varna's weekly broadcast to the Black Sea is on 7400, 100 kW non-direc-

tional, from Sunday 2100 to 0300 Monday (Observer, Bulgaria) Or just 2115-0100; address is: Radio Varna, Primorski Boulevard 22, Varna 9000, Bulgaria (Rumen Pankov, R. Bulgaria DX Program via John Norfolk, DXLD)

BURMA [non] A-05 Democratic Voice of Burma: 2330-2430 9435 Jülich 100 kW; 1429-1526 17625 Madagascar 50 kW; 1430-1530 5910 Almaty 200 kW (via Wolfgang Büschel, BC-DX)

CANADA Best bets for hearing RCI/CBC in NAM: 1200-1500 weekdays, 1300-1600 weekends on 9515, 13655, 17800; 1900-2200 on 17765 (for Caribbean and SE USA, yet beamed WSW at 240 degrees); 2000-2100 15325 (for Europe at 60 degrees, but good here off the back at 240); 0000-0200 on 9755, 11990, 13710 (gh)

CENTRAL AFRICAN REPUBLIC [non] Radio Ndeke Luka A-05 in French and Sango via VT Communications: 1730-1930 11760, Dhabbaya, UAE, 250 kW, 245 degrees; 1830-1930 15470, Wofferton, UK, 300 kW, 152 degrees (Observer, Bulgaria)

CHINA [non] Last month's item about CRI via Albania, 0000-0357 lacked the frequencies! 6020 and 9570 (gh)

COLOMBIA R. Líder, 6139.78 at 0653 superb reception, also at 0115, two hours before sunset, very powerful (Walt Salmani, BC, DXLD) Romantic music, also very good here until blocked by DW at 0559 (Manuel Méndez, Spain, *ibid.*) Lucked into a relatively clear frequency, in our evenings, except when Cuba shows on 6140, and Turkey at 0300-0400 (gh)

CROATIA [and non] V. of Croatia, 9925 via Germany, 2215-2230, rapid-pace American English, but announcers had clearly Croatian names, concluding with one minute each of sports (NBA Croatians), weather, headlines; another Croatia Today time (converted from local): 0200 and an update at 1800, wrong frequencies (gh) Actually heard 1805-1815 on 6165, 13830 direct (Mike Barraclough, World DX Club Contact)

CUBA On April 5 at 2025, instead of the usual R. Nacional de Venezuela relay on 13680, I heard 5-

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming;
+ = continuing but not monitored; 2 x freq = 2nd harmonic; A-05=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

digit Spanish YL spy numbers; open carrier pause from 2040 until starting over at 2059 with "Atención 888, 16"; other days back to Caracas or no signal (gh)

DJIBOUTI As expected thanks to US aid in exchange for R. Sawa on 1431, RTV Djibouti was able to resume SW after some 30 years' silence, on 4780, first reported March 18 by Thorsten Hallmann, Germany, at 1736, and then heard all over the world thanks to refurbished antenna and new 100 kW transmitter (gh) Until sign-off with anthem at 2002 (Mika Mäkeläinen, Finland, dxing.info) Heard until fade 0420, more than hour past local sunrise (Guy Atkins, WA, HCDX) From sign-on at 0300 and a big open carrier before then (Scott R. Barbour, Jr., NH, DXLD) Very strong every evening past 0400 (Adán González, Venezuela, *ibid.*) Under Guatemala at first, then dominating (Rich D'Angelo, PA, NASWA Flashsheet)

ECUADOR New station heard in mid-April testing on 4909.27, Radio Chaski, Otavalo, Imbabura. Talked to Señor Chaquiguanu Cotacachi Luis, who told me he is also owner of Chaskis del Norte, Ibarra, on 950 kHz. Is very interested in receiving reception reports to: Radio Chaski, Jirón Roldos Aguilera y Panamericana Norte, Otavalo, Imbabura, Ecuador. email: radiochaskis@hotmail.com (Björn Malm, Quito, DXLD) Fair signal here with folk music from 0130 to closing at 0300 (Rafael Rodríguez, Colombia, *condiglist*) Testing from 2310 past 0000 on 4909.26 (Jan Edh, Sweden, SW Bulletin) This appears in government's Supertel PDF SW page; remember when 4910 was Emisora Gran Colombia in Quito? (Dario Monferini, via Malm)

Radio Quito at 0251 on 4918.98, reactivated (Mark Veldhuis, Netherlands, dxing.info)

EGYPT R. Cairo heard on new 11885, English to NAm, 2300-2430, somewhat muddy modulation, but good signal and no interference (gh) English to Europe continues 2115-2245 on 9990. To SAs 1215-1330 on 17835 and Af 1630-1830 on 11880 (Mike Barracough, World DX Club Contact) WWCR shifted from 9985 to 9975 until 2200, good news for half of Cairo's broadcast (gh)

ETHIOPIA [non] A-05 R. Mustaqbal via VT Communications, Dyabbaya, UAE, 15530, 250 kW, 225 degrees in Somali Mon/Tue/Thu: 0630-0700 and 1130-1200 (Observer, Bulgaria)

Two new target radio programs (with political background) in Amharic appeared on TDP <http://www.airtime.be/schedule.html> - Tensea Ethiopia Voice of Unity, Sun 1500-1600 on 15660; and Radio Voice of ENUF, Fri and Sun 1700-1800 on 12120, website <http://www.enufforethiopia.org> (Bernd Trutnau, Lithuania, DXLD) ENUF already - means Ethiopian National United Front (gh)

FRANCE [and non] RFI A-05 English; A=Ascension, C=China, G=Gabon, S=South Africa. Frequencies in () replace the preceding one from Sept. 4. Af/ME: 0400-0430 7315-G(9805-G) 11700; 0500-0530 9825-G(11995-G) 15160(13680); 0600-0630 11665-A 15160 17800; 0700-0800 15605-G; 1200-1230 17815-A 21620; 1600-1700 7170-S 15160-S 17850; 1600-1730 15605 17605; India 1400-1500 9580-C(7180-C) 15615 (RFI website via Jean-Michel Aubier, France, DXLD)

GREECE [and non] English from VOG: daily 1830-1855 Orientation program including news on 12105; Sun 0905-1000 It's All Greek To Me, music on 9420 11645 15630 15650 21530. Hellenes Around the World, Sat 1400-1500 on Delano 9775, subject to sports preemptions (John Babbis, MD, DXLD)

HUNGARY R. Budapest, English to NAm at 0100-0130 is on 9590 except Sundays on 9560; 0230-0300 daily on 9795 (Bob Thomas, CT, DXLD) What conflict could be pushing them off 9590 one day a week? No clues in HFCC A-05 as censored (gh)

IRAN VIRI's "Voice of Justice" heard on unannounced 9495, at 0130, still announcing 6120, heard weakly, and 9580 blanketed by CRI relay, tho pristine via satellite (Loren Cox, Jr., KY, DXLD)

[non] R. Seda-ye Mellat-e Iran [probably via Issoudun, France] clandestine in Persian, moved an hour earlier for summer to 1330-1359:50 but clashing with China's CNR8 program, also followed by Iranian jammers, bubble type on 11629, and oscillating tone on 11630.28 (Wolfgang Büschel, BCDX)

A-05 Seda-ye Iran / Voice of Iran in Farsi: 1530-1730 on 11575 Sofia, 100 kW, 90 degrees.

New clandestine in Farsi from March 28, Seda-ye Jambushi Iran e Farda, 1600-1645 on 7490 Moldova, 500 kW, 116 degrees (Observer, Bulgaria) Not to be confused with our R. Farda (gh)

This time and frequency are registered for FEBAL (Wolfgang Büschel, BC-DX) Gave web-address as <http://www.sosiran.com> and e-mail as hasteh@sosiran.com Run by the Iran of Tomorrow Movement, 17328 Ventura Blvd. #209, Encino, CA 91316, USA. Certainly seems like a clandestine. E.g. says Iran of Tomorrow Movement is looking for volunteers dedicated to the cause of Democracy in Iran. If you are in full agreement with IOTM's Mission, Vision and Plan, Please fill out the form and fax it to 818-474-7229. We will get back to you as soon as possible. NOTE: DO NOT SEND US ANY PRIVATE INFORMATION SUCH AS YOUR REAL NAME, PHONE NUMBER, ETC. To register a 1-5 person cell (Finn Krone, Denmark, BC-DX) Iran of Tomorrow Movement Inc. (IOTM) is a Not-For-Profit 501c(4) organization (activistchat.com via Bernd Trutnau, BC-DX)

ISRAEL IBA A-05 schedule states: "According to IBA request, all broadcasts cease at 30.06.05 meaning NO shortwave" (gh) This is more of a "status-quo" than an extension. The Director General is the one who set the March 31st date. This must first be ratified by the IBA Board of Governors. There is no IBA Board of Governors at the moment, so the decision was never made final. Hence the extension (Doni Rosenzweig, DXLD)

"Subject to the IBA governing plenum deciding to continue shortwave transmission after June 30, 2005": English to Eu/NAm, u.o.s.: 0330-0345 11605 (7545 from Sept) 9345, AuAs/SAm 17600; 0930-0945 15640 17535; 1730-1745 9345 15640; 1900-1925 11605 15640, Af 15615.

Hebrew / Reshet Bet: 0400-0500 9345, 0500-0930 17535, 1030-1400 17535, 2000-2100 15640, 2100-2300 11585, 2300-0330 9345 (via Doni Rosenzweig) Will this schedule cease end of June or end of October? (George Poppin, official IBA monitor to Moshe Oren, Bezeq) Hi George, Hope it will be

until October and more (Oren to Poppin)

ITALY Radio Mi Amigo, the ultimate free radio station, now broadcasts every Saturday between 0800 and 1500 on 15725 (Neil Gates, Radio Mi Amigo, via Swoop Chakroborty, DXLD) That's on IRRS, 20 kW, presumably actually Italy, now that WRMI has left 15725 (gh)

LAOS [non] Hmong Lao Radio shifted to Sat 1200 and Sun 1300, both on new 11785 via WHRI South Carolina. Note that other days of the week at same times, 15285 is in use (gh)

LATVIA RTI, Radio Tatras International from Poprad, Slovakia, on FM and webcast <http://www.rti.fm> premièred April 9-10, Sat 1730-2300 & Sun 1800-2300 on 9290 (Bernd Trutnau, Lithuania, DXLD) Unclear whether this SW schedule would continue. This is another project of Eric Wiltscher, following offshoremusicradio.com (gh) RTI says that reception reports are not wanted, and will not be verified. "We really can't have people sitting there sending out QSL cards when we have a commercial radio station to run," RTI says (DXing.info) Knows how to win friends.

LIBYA [non] LJB A-05 via TDF 500 kW Issoudun, France, in Arabic with azimuths:

1000-1400	21695	140
1100-1230	15610	204
1100-1230	17695	185
1100-1500	21675	153
1600-1800	15660	204
1600-1800	17695	185
1700-1800	17880	153
1700-1900	15615	140
1800-1900	11615	204
1800-1900	15660	185
1800-2000	15205	153
1900-2030	11715	140
2000-2130	11635	153

(Observer, Bulgaria)

MALDIVE ISLANDS [non] Minivan Radio, via Radio Miami International via Jülich, Germany, A-05: 1600-1700 daily on 12015 (via Aloke Gupta, DXLD)

MÉXICO We hope that XEYU, Radio UNAM will be back on the air by the end of May with 10 kW on 9600 (Julián Santiago Díez de Bonilla, Radio Mil, via Manuel Méndez, Spain, DXLD)

Re April MT, DRM on R. Educación, 25620: Glenn, The 12 second fading periodicity is interesting as this is 10 times the duration of what is termed the multiplex superframe, which has a duration of 1.2 seconds. The superframe is made of 3 frames of 400 ms duration. The symptoms you describe may be a function of applying energy dispersal algorithms to the data stream or it could also be a function of the audio being encoded. I am used to watching the DRM waveform on a spectrum analyser display so I have never experienced the phenomena you describe. I have seen the DRM spectrum become lopsided on many occasions before returning to the more familiar flat-top spectrum. (Kevin Ryan, <http://www.radioeng.co.uk>)

NETHERLANDS ANTILLES RN's A-05 transmission schedule shows these new DW relays now that Antigua is off, on some familiar frequencies but now via Bonaire (rather than French Guiana), with azimuths:

2200-2358	15410	ENAm 350
0000-0158	11955	ENAm 350
0200-0400	9735	CNAm 320
0400-0458	9735	WNAm 290
0500-0600	9735	CNAm 320

(Glenn Hauser, World Of Radio)

NEW ZEALAND RNZI tentative schedule for DRM testing starting May 1; each could be on 35 or 325 degree antenna: 0700-1900 7145, 1845-2000 9615, 1945-2100 11675, 2045-0500 13730, 0445-0700 9615 (BC-DX) Notice they, too, insist on using in-band frequencies for DRM! Buzz, buzz (gh)

PAKISTAN PBC A-05 schedule, English: 1600-1615 ME/NWAF 11570 15100, E/SEAF 11850 15725; Urdu 0800-1104 opens and closes with English news, WEU 17835, E/SEAF 15100. Assami [which used to be partly in English; can anyone still confirm?] SAs 0045-0115 9340 11565. Some odd frequencies appear also: 17484 at 1200-1245 Bengali, 1245-1315 Nepali; 9324 at 1715-1800 Irani, 1800-1900 Urdu (via Aloke Gupta, DXLD) These 100 kW Rawat (Islamabad) transmitters do deviate at times, but can't confirm here. Internal SW service schedule adds English news on 7395 at 0800-0810, 1100-1104; Current Affairs service [partly English] on 5080 at 0200-0400 and 1300-1800. And note unusual frequency 6780 for Balti and Sheena news at 1350-1428 (Noel Green, UK, DXLD)

PERÚ I.D.L. Radio heard at 0100 on 4949.96; what is this? (Björn Malm, Ecuador, DXLD) Your clip had a clue it is Perú, so likely R. Madre de Dios, Puerto Maldonado, relaying something or with a new name (gh) Ideele Radio; See <http://www.ideeleradio.org.pe> - a program produced in Lima, relayed by lots of stations (Henrik Klemetz, Sweden, HCDX) Listening further, also heard R. Madre de Dios ID (Malm)

[non] On the WRMI schedule, UT Sunday 0030-0045 on 9955 is Radio Fuerza Democrática, and it should still be on the air for a long time, since elections aren't until next year. It may expand to a half-hour at some point. They are going to be doing a series of interviews with all of the Peruvian presidential candidates - not just the Fuerza Democrática candidate (Jeff White, WRMI, DXLD)

SOMALIA [non] A new target station was added to TDP as in <http://www.airtime.be/schedule.html> - Radio Horyaal, 1730-1800 on 12140, Sat thru Thu in Somali. Website <http://www.halganews.com> says 12130 (Bernd Trutnau, Lithuania, DXLD) Heard on 12140 toward end of B-04 (Mike Barracough, UK, Scott Barbour, NH, *ibid.*) For A-05 switched to 12130 (Jose Miguel Romero, Spain, *Noticias DX*) Its own website is <http://www.horyaal.net> with e-mail address radio@horyaal.net (Trutnau, DXLD) Via Samara, Russia, 240 kW at 188 degrees (Wolfgang Büschel, *ibid.*) 12130, *1730 just after hearing V. of Oromo Liberation closing 1730* on 12120 with even better signal. Website of R. Horyaal reported that their reporter Ahmed Saleban Dhuuhul had been arrested in Hargeisa, and denied it is a clandestine (Finn Krone, Denmark, DSWCI DX Window)

Shortwave Broadcasting

SOUTH AFRICA Channel Africa A-05 English, all to parts of Africa, with kW:

0300-0355 6160 500
0300-0500 3345 100
0500-0555 9685 500
0500-0800 7240 100
0600-0655 15440 250
1000-1200 11825 100
1400-1600 11825 100
1500-1555 17770 500
1700-1755 15235 500
2000-2200 3345 100

(Kathy Otto, Sentech Ltd via Alokesh Gupta, DXLD)

SPAIN English from REE at 0000 was heard on its summer frequency 15385 the first day of A-05, but gone halfway through the hour, and not heard the following several days (Rick Barton, AZ, DXLD) They registered both 15385 and 6055. Nothing on the latter, and 15385 dominated here by VOA Mandarin via Philippines, and Chinese jamming (gh, OK) 15385 again heard a week into A-05 (Daniel Sampson, WI, *ibid.*) Also VG here in New Zealand (Philip van de Paverd, *ibid.*) The Chinese interference was a problem as far east as CT (Bob Thomas, *ibid.*) Didn't we say this in previous summers? 15385 is too high for this service, too subject to lowered MUFs; should use 9 or 11 MHz, or better yet, Costa Rica relay (gh) English to Eu/Af same as last summer, weekdays 2000, Saturdays 2105, on 9570, 15290, Sundays 2100 on 9570, 9840 (Mike Barracough, UK, DXLD)

REE's Crónica en Lenguas Cooficiales [Catalan, Basque, Galician] is now at 1240-1257 M-F on 21700, 21610, 21570, 21540, 15585, 15170, 13720, 11815, 9765; Sample of Sephardic language and mp3 files are at <http://www.rtve.es/rne/ree/prsefar/sefardi.htm> - "La Emisión "SEFARAD" en lingua Djudeo-espanyola, es un programa aparejado por Matilda i Rajel Barnatan, ke destaka la fruchiguosa erensis ke quadraron los dijudios de Espanya. . ." with the NAm half-hour at 0415 UT Tuesdays moved to 9650 (gh)

SUDAN [and non?] E-mail reply from Peter Stover of R. Peace, originally on 4750, says testing on 5895 at 0300-0330 and 1700-1730; not clear from where (Christer Brunström, Sweden, SW Bulletin) Then confirmed on 5895 between 1700 and 1730, starting with religion in English until 1715, strong carrier but undermodulated. Africa Messenger pdf publication at <http://www.persecutionproject.org> reported an upgrade to 5 kW and a rhombic antenna (Jari Savolainen, Finland, World Of Radio) Another issue claims it broadcasts in 7 indigenous languages as Sudan's first Christian station, countering radical Islam (gh) Upgrade to 5 kW could explain substantial increase in signal strength on 4750 I noted in Nairobi in January and February, compared to what was observed in 2004 (Chris Greenway, DXLD)

SWEDEN [and non] We have to renegotiate our contract with Teracom, who own the transmitters we use in Sweden, in the next few months; we have the option of going elsewhere such as to VT Merlin for SW transmission (George Wood, Radio Sweden, on VOA Talk to America)

SYRIA R. Damascus, Spanish found by chance at 2354 on new unlisted 9330 (José Miguel Romero, Spain, *Noticias DX*) Fair here at 0010 by QRM in English, tentatively WBCQ (Rubén Guillermo Margenat, *Conexión Digital*) Had been scheduled 2320-2430 on 12085 (WRTH 2005) Could not hear Syria here even on USB as WBCQ is LSB only, but in areas where they clash, Damascus ought to stay on USB only (gh) Syria also on 9330 for German 1805-1905 (Rumen Pankov, Bulgaria, BC-DX) And 1605 in Turkish, then Russian (Noel Green, UK, *ibid.*)

[non] R Free Syria, A-05 via Radio Miami International via Jülich, Germany: Sundays 1800-1859 on 13650 (via Alokesh Gupta, DXLD)

THAILAND [and non] R. Thailand A-05 in English via IBB Udorn u.o.: 0530-0600 17690 Eu, 1230-1300 9600 SEAs/Au, 1400-1430 9830 SEAs/Au, 1900-2000 7155 Eu, 2030-2045 9680 Eu, 0000-0030 9570 Af, 0030-0100 5890 Carib (Greenville), 0300-0330 5890 WNAm (Delano) (Aaron Zawitzky, DX Listening Digest) The trouble is, the second half of a one-hour news-magazine airs at 0030 and the first half at 0300, full of promotional considerations (Ted Schuerzinger, NY, swprograms)

TURKEY VOT got a new director, Miss Engin Asena, who is Turkish, and formerly chief of German section. She has been to EDXC conferences, is very fond of international radio, hopes to develop contacts with DXers around world. English at 03 on 6140 7270 to NAm, also good here (Luigi Cobisi, Italy, European Perspective, HCJB DX Partyline)

UGANDA [non] After several delays, R. Rhino International resumed April 11 after a break of more than a month, M-F 1500-1530 on 17870 via Germany; due to poor propagation not audible here in OK at first (gh) Confirmed April 13, poor but audible here (Andy Sennitt, Netherlands, DXLD) Better here (Alan Pennington and Noel Green, UK, *ibid.*)

UAE Emirates Radio, Dubai seems to have ceased using SW since the start of A-05 period on Mar 27! (Noel Green and Anker Petersen, DSWCI DX Window) I had a heard an open carrier March 29 at 1430 on 21605, last gasp? (gh, OK)

UK [and non] What's left of BBCWS for the C & S America, following the drastic cuts for A-05, the closest they can get to NAm on SW, with Antigua dormant: French Guiana at 295 degrees across the middle of Mexico is best: 1000-1100 6195, 1100-1300 11865, 1300-1400 15190, 2100-2200 15390, 2200-0100 5975, and at 255 degrees, 0200-0300 5975. Via WYFR: 1200-1300 on 9605 to CAm, poor here with FE interference. Bonaire: 1200-1300 15190, 2100-2200 M-F 11675. At 0200-0300 there is also 12095 from UK and 9825 from Ascension, and 0300-0400 5975 from Delano. These include the Caribbean cut-aways during the 1100, 1200 and 2100 hours. It took more than a month to fix annoying audio dropouts on the French Guiana transmitter.

There are still broadcasts to Europe, Mideast, Africa and Asia we can get if we're lucky, but usually not with signal strength for easy portable listening. For example, the relay in Thailand aims 25 degrees toward EAs, and that carries on

to NAm when the MUF coöperate: 1000-1400 on 17760, 0000-0100 on 17655, not all in English (gh)

USA [and non] The Broadcasting Board of Governors will outsource the overnight shift for the VOA English newsroom to Hong Kong. VOA Director David Jackson supported this because it would save money. We question whether English news broadcasts by VOA should be written by non-Americans in a foreign country (AFGE Local 1812) Every day between midnight and 7 a.m., ET, the Voice's new state-of-the-art multimedia newsroom will be closed. The news will be "contracted out" to a team of eight editors and writers (reportedly Americans, British and Australians) in Hong Kong, Peoples Republic of China. Some sources project cost savings at about \$300,000 annually, in a VOA budget of approximately \$168 million. If implemented, the proposed schedule will mark the first time since at least the early 1950s that the VOA HQ newsroom has gone dark.

Relocating VOA central news operations in the PRC for nearly a third of each day poses significant risks. In the event of another Tiananmen uprising or a Beijing assault on Taiwan, the Chinese regime could shut down VOA's worldwide news service in a flash, either by cutting communications or by expelling staff. The proposed outsourcing of news services to PRC-based contractors appears to be the latest in a series of measures aimed at dismantling the Voice and its global reach. Since 1999, the U.S. Broadcasting Board of Governors, which oversees VOA, has cut the number of its worldwide SW frequencies in English from 354 to 52. VOA English broadcasts can no longer be heard in Latin America or Europe (East and West) and are barely audible in the Middle East (Alan Heil via John Figliozzi)

What will be written if the Chinese invade Taiwan? Will there be a story saying, "One million brave Chinese volunteers, responding to desperate pleas for help from their cousins in Taipei, crossed the Taiwan Strait this morning?" (Al Kamen, via Bill Westenhofer) Got the Hong Kong idea from CNN? (gh)

While in the B-season, 15580 was from Greenville, providing a good signal over most of North America for VOA English in the afternoon, in the A-season this frequency moved to Botswana, and Greenville to 15445 at 1900-2200; second choice, or first choice in the Greenville skip zone, is Morocco on 15410 at 1700-2200. VOA has also invaded an aeronautical band, cozying up to Iran on 15085? (gh) 15090 from Kuwait to Afghanistan at 0930-1830, RFA and VOA alternating Pashto and Dari, 250 kW, 70 degrees (Observer, Bulgaria)

RFE/RL unveiled its new logo at the end of March, replacing the Liberty Bell in blue – a silver torch with a burnt-orange flame, symbolizing the fight for democracy (RFE/RL via AIB) Looks all orange to me (gh)

Transformation Media International, in Albany, OR, has applied to the FCC for a construction permit for a SW station near Lebanon, Oregon, four 50-kilowatt PEP reduced carrier USB transmitters, three rhombic antennas toward NE Asia, Caribbean, CAm, northern SAm; and a log periodic to C&E Canada. It intends to offer a variety of programming such as news, religious teaching, educational, comedy, and music, in English, Spanish, French, Russian, Japanese, Korean and Mandarin. Michelle Brosnan, operations manager, attended the February HFCC-ASBU Conference in Mexico City to learn more about international broadcasting and SW frequency planning (NASB Newsletter) Behind TMI is Bob Lund. It's primarily religious (Jeff White, FL, DXLD)

Many of you knew our chief engineer at WRMI, Kiko Espinosa. He had been very ill for a number of months with inoperable cancer. I am sorry to report that on April 6 Kiko passed away. Kiko was one of our partners at WRMI, and had been in charge of the engineering aspects of the station ever since we went on the air 11 years ago. He almost single-handedly built the transmitter site, maintained it, kept the transmitters on the air and fixed anything that went wrong over the years. We know he had a great sense of accomplishment when WRMI went on the air as a commercial shortwave station in 1994 (Jeff White, WRMI, DXLD)

KVOH was monitored running reduced-carrier, although not intentionally. On 17775 at 1607 UT March 28, a screaming preacher in Spanish made the S-meter jump with modulation; quite distorted, not enough carrier like WBCQ's 'compatible' SSB.

Another outlet with slightly reduced carrier was WHRA, April 5 at 1427 with the S-meter moving slightly at modulation peaks on new 15310. This was more obvious once the very strong signal was attenuated. Is this deliberate or merely a symptom of an ailing transmitter? There was also a slight squeal, à la CRI/RHC (gh)

WRNO's reactivation kept getting put off, still not on by April 15 (gh)

VENEZUELA R. Amazonas is heard on 4939.67 only in the mornings, such as 0937; no sign of it in the evenings (Adán González, Venezuela, DXLD)

WALES [non] Altho Wales Radio International coöordinated a schedule for A-05, there will be no need for it: website announced that the weekly Celtic Notes was suspended from end of March, hoping to return in the autumn. A multi-week string of transmission failures by the Austrian relay, as monitored by Bernie O'Shea, may have prompted this (gh)

ZIMBABWE [and non] To combat jamming as the March 31 elections approached, SW Radio Africa had to keep changing frequencies and relay sites. Afterwards, as of mid-April, the schedule became: 1600-1800 15145 and 1800-1900 11770 via UK; 1600-1900 12145 via Samara, Russia, 3300 and 4880 via South Africa (gh) The UK frequencies were free of jamming (David Pringle-Wood, Harare, DXLD)

Meanwhile, the Mugabe government was reported about to launch its own 24-hour 'news' station on SW, New Ziana (Xinhua via Ydun Ritz) They should convert the jamming transmitters and leave SWRA alone in the battleground of ideas (gh)

Until the Next, Best of DX and 73 de Glenn!



0009 UTC on 6215

ARGENTINA: Radio Baluarte. (Tent.) Spanish. Musical ballads to announcers' chat. No discernible ID noted with poor-weak signal observed under static. (Scott Barbour, Intervale, NH) RAE 11710, 0200 (Roger Nash, Heber Springs, AR) 11710, 0030+. (Arnaldo Slaen, Buenos Aires, Argentina) **Radio Continental** 15820 LSB, 2109-2120+ (Harold Fodge, Midland, MI) 2355-008 Spanish. (Barbour, NH)

0100 UTC on 4052.5

GUATEMALA: Radio Verdad. Spanish. Sign-on ID and announcer's urging listeners to write to religious program. (Fernando Garcia, Baltimore, MD) 0400-0405. (Joe Wood, Greenback, TN) 0403-0417+ (Fodge, MI) Guatemala's **Radio Cultural Coatán** 4780, 0249-0320*. (Fodge, MI)

0120 UTC on 5910

UKRAINE: Radio Ukraine Int'l. Heavy accented male's English reading of station reception reports. SIO 3+43 with no audio interference detected; 5840, 2206-2212+; 5910, 0131-0136+. (Fodge, MI) 5840, 2248-2300. (Duane Hadley, Bristol, TN)

0230 UTC on 9660

FRENCH GUIANA: Radio Japan relay. Portuguese service to South America including drama and operas. (Garcia, MD) **Radio France-French Guiana** relay 17630 at 1820. (Alvin Mirabal, Puerto Rico)

0330 UTC on 4976

UGANDA: Radio. "You are tuned to Radio Uganda," followed by announcer's English news text. Signal fair with intermittent signal fading. (Sam Wright, Biloxi, MS) Frequency monitored at 0430-0445 with weak English service and regional music. (Frank Hilton, Charleston, SC)

0428 UTC on 3975

HUNGARY: Radio Budapest. Multilingual IDs with brief piano interludes. Followed by Spanish programming at 0430. (Nick Kucji, VT)

0500 UTC on 6195

UK: BBC. Station identifications to featured segments. (Daniel Mol, Jr. N3RUM, Eynon, PA) **BBC Antigua** relay 11675, 2110. (Lou Rossetti N1PUX, Arlington, MA) 13660, 1711. (Mirabal, PR)

0912 UTC on 3173

PERU: Radio Municipal. Spanish folklorica programming to regional briefs. Peruvian's audible in Spanish; **Radio Atlantida** 4790, 0955; **Radio Victoria** 6021, 1030; **Radio Oriente** 6188, 1045; (Mirabal, PR) **Radio Union** 6114.86, 0857-0905 (Slaen, ARG) **Radio Maranon** 4835, 1057-1108. (Barbour, NH)

0931 UTC on 3279

ECUADOR: La Voz del Napo. Announcer's Spanish family greetings and salutations. (Mirabal, PR) Ecuador's **HD210A**, 3810 at 1005. (Garcia, MD) **Radio Quito** 4919, 0458-0525 Spanish. (Tom Banks, Dallas, TX)

0932 UTC on 3375

BRAZIL: Radio Educadora de Guajar Mirim. Portuguese text from male program host and Braz pops. ID and local ads at 0949. Very good signal. Brazilians in Portuguese; **Radio Caiara** 4785, 1045-1052. (Rich D'Angelo, Wyomissing, PA/NASWA Flash Sheet) **Radio Nacional da Amazonia** 11780, 0600-0610. (David Weronka, Benson, NC) **Radio Clube do Para** 4885, 0457-0509. (Wood, TN)

1128 UTC on 4790

INDONESIA: (Celebes) RRI-Makassar. Indonesian. Continuous music ballads and pop music slipping under increasing "sweeper" interference. Poor/fair copy. Indo's audible: **RRI-Serui** 4604.97, 1153-1202; **RRI-Makassar** 4749.98, 1250-1300; **RRI-Palangkaraya** 3325, 1250-1300. (Barbour, NH) **RRI-Serui** 4605, 1150-1210. (Hilton, SC)

1130 UTC on 4460

CHINA: CPBS. Military music at tune-in. Announcer's comments, ID and items about China, presuming to be news briefs. (Banks, TX) **China Radio Int'l** 9700, 1422-1430+. (Fodge, MI) **Xinjiang PBS** (tent) 4980, 0104-0135. (D'Angelo, PA)

1403 UTC on 7240

AUSTRALIA: Radio. Asian news to ID at 1405 and RA Sports Desk to "this is your Asian-Pacific Network, Radio Australia." (Fodge, MI) **VL8A-Alice Springs** 2310, 1042-1102. (Barbour, NH) 1102-1125 // **VL8T-Tennant Creek**; **VL8K-Katherine** (poor). (D'Angelo, PA)

1456 UTC on 11690

JORDAN: Radio. Pop vocals to two time pips at 1500. English news-cast to "and that's the end of the news from Radio Jordan." Music program, *Listeners Choice* from 1504. (D'Angelo, PA) 11690, 1538 Radio Jordan ID plus "96.3 FM". (Fodge, MI)

1500 UTC on 21570

SPAIN: REE: Spanish ID into program *Spaniards at Sea* and national news. Vocals and literature readings for transmission targeted for Spanish fishing fleet. Closedown at 1557. (Garcia, MD; Weronka, NC; Wood, TN)

1625 UTC at 13675

AUSTRIA: RAI. Report on national education and labor in Austria. (Fraser, ME)

1800 UTC on 15240

MOROCCO: Voice of America relay. World news to weather report. (Rossetti MA) Additional relays; **VOA-Botswana** relay 4930, 0328-0340. (Barbour, NH) **Radio Taiwan** via Okeechobee, Florida 9355, 2210. (Nash, AR)

1854 UTC on 6070

CANADA: CFRX. *The Phil Edmonston Show* to auto fix it call-in segments. News and ads to *The Real Estate Show*. Many IDs and "News-Talk 1010 CFRB Toronto." Better than // 1010 kHz AM. (Fodge, MI) RCI 9810 // 6190, 0200-0230. (Nash, AR)

2000 UTC on 7285

ALBANIA: China Radio Int'l relay. World and national news coverage on China. (Fraser, ME) 6020, 0135-0154+; Albania's **Radio Tirana** 7120, 2245-2258*. (Fodge, MI)

2000 UTC on 15315

NETHERLANDS ANTILLES: Radio Netherlands relay. *Vox Humana* on the art of war // 17725. (Fraser, ME) Various Radio Netherlands relay sites monitored on 11655 at 1900. (Rossetti, MA)

2025 UTC on 9535

THAILAND: Radio Thailand. Lady's slow-speed English text to time check, chimes signal and ID at 2030. National news SIO 242 // 9680. (Fodge, MI) 5890, 0030. (Rossetti, MA) Thailand's **Bangkok Meteorological Service** 6765 USB, 0928-0945+. (Slaen, ARG)

2110 UTC on 7300

RUSSIA: Voice of. News item on North Korea allows Russian scientists animal study. (Fraser, ME) VOR 5900, 0200. (Garcia, MD) **China Radio Int'l** Russian relay 7170 at 2201. (Fodge, MI)

2159 UTC on 6926

PIRATE: WKIL. First logging of station with blues and jazz tunes. Mostly unreadable but improved to hear "This is Jack Black transmitting from a remote location," plus ID as "WKIL". Tunes from Led Zeppelin and Hendrix's Voodoo Chile. Poor reception at best. (Wood, TN)

2245 UTC on 5800

BULGARIA: Radio. *Answering Your Letters* segment // 7500. (Fraser, ME) 9700, 0030-0035. (Weronka, NC)

2258 UTC on 7345

CZECH REP: Radio Prague. Sign-on announcements to French service ID and world newscast. (Wood, TN)

2300 UTC on 21740

AUSTRALIA: Radio. World newscasts good signal quality. (Fraser, ME) **HCJB Australia** 15390, 1441-1457+ with *Harvest Radio* program. (Fodge, MI)

2315 UTC on 7115

EGYPT: Radio Cairo. News on Iraq presented by announcer duo. Fair to good signal with amateur radio interference. (Fraser, ME) 7260, 0200-0230. (Nash, AR) 6970, 0042-0050 Spanish // 9415 (good) 9415 (good) 11755 (poor). (Barbour, NH) Three interval tones at 0200 on 7260. Spanish ID with freqs and program promo //9415. (Garcia, MD)

2345 UTC 11800

ITALY: RAI. Italian service ID to non-stop classical music program. (Fraser, ME) 15320, 1750+. (Mirabal, PR)

2350 UTC on 5960

TURKEY: Voice of. Good signal quality for *Turkish Sports in the Republican Era*. (Fraser, ME; Nash, AR) 15350, 1512+. (Wood, TN)

Thanks to our contributors – Have you sent in YOUR logs?

Send to Gayle Van Horn, c/o Monitoring Times
(or e-mail gaylevanhorn@monitoringtimes.com)
English broadcast unless otherwise noted.

John Figliozzi

johnfigliozzi@monitoringtimes.com

The Shrinking BBC and VOA

“Life is what happens to you while you’re busy making other plans.”

— John Lennon.

At the close of May’s missive, I confidently stated that this month’s column would deal with a review of U.S. international broadcasters and their programming. Oh, how wrong I was!

We do try (and how we try!) to be current here. In the time since I wrote those words, two events have conspired to draw our more immediate attention above the topic that we honestly intended to cover this month. Those topics are: (1) the continuing decline of the BBC World Service on shortwave; and (2) the incredible, further shrinking of the Voice of America.

❖ The BBC as DX Catch

I think it’s safe to say that during the halcyon days of shortwave none of us would have anticipated a time when the BBC World Service would become something of a DX catch for North American listeners. Yet that is the direction in which things are going, as the BBC again surprised us with a further reduction in shortwave use overall, as well as another downgrade of its HF service to the Americas – that is, Central and South America and the Caribbean (service to North America ended in July 2001). I say “surprised” because there was virtually no advance warning given – just three weeks. Consequently, the schedules that appeared in the April issue of this magazine did not reflect those changes.

So, on shortwave at least, the Americas stream of the BBC World Service can be heard only from 1000-1400, 2100-0100 and 0200-0400 UT. Furthermore, those broadcasts no longer emanate from the Caribbean island of Antigua. The BBC and Deutsche Welle (DW), which jointly owned and operated this venerable relay facility, decided to shut it down as a cost-cutting move. The Radio France Internationale-owned facility in Montsinery, French Guiana, is now the source of most of the World Service transmissions to the

Americas, with other relays coming by way of Delano (California), Okeechobee (Florida), Ascension Island in the mid Atlantic, directly from Skelton in the UK (see chart), and a previously unused site for the BBC – the Radio Netherlands relay on Bonaire.

My experience thus far is that the BBC is harder to hear on shortwave than it’s ever been. Of course, I live in upstate New York. Listeners located in the southern half of the U.S. may have noted virtually no difference, save for the reduction in hours.

during the day.

For those who are not inclined to pay over \$130 a year for satellite radio or who don’t find the internet a comfortable alternative to traditional radio, the BBC has, indeed, become something of a challenge to hear, especially around the clock. With no shortwave transmissions specifically targeted to North America, experiences with frequencies targeting other regions will tend to vary quite noticeably from place to place. However, in the spirit of mutual assistance to fellow shortwave listeners in similar distress, chart 2 shows what frequencies (other than those for the Americas stream in Chart 1) are proving generally useful for my location in Halfmoon, NY (150 miles due north of New York City).

Results will be enhanced either through use of a more sensitive portable or the use of an external antenna. The latter can be something as simple as a length of copper wire (insulated or not) with one (exposed) end wrapped around the retracted whip antenna. Experiment a little, but don’t be surprised if you find that the external is now a necessity for you to hear some BBC broadcasts on shortwave in reasonable quality.

❖ What about DRM?

As we enter a fourth year of Digital Radio Mondiale (DRM) broadcasts, we continue to await the introduction of a reasonably sized and priced “all in one” receiver capable of decoding these broadcasts “right out of the box.” Although the BBC World Service broadcasts to North America two hours a day in DRM mode (see chart 3), one is reminded of the old “If a tree falls in a forest but no one hears it, does it make a sound?” philosophical query. Apparently, the World Service feels, at this point, that its money is better put to use broadcasting two hours a day to North America in a mode which holds promise but virtually no one can receive, as opposed to a tried and true method that admittedly might be in a slow decline but does definitely have listeners.

After more than one false start, the DRM consortium now says that “off the shelf” affordable

Chart 1: BBCWS Americas Stream on Shortwave

Freq kHz	UTC	Target	Relay Site
6195	1000-1100	Caribbean	Montsinery
11865	1100-1300	Caribbean	Montsinery
9605	1200-1300	Central America	Okeechobee
15190	1200-1300	South America	Bonaire
	1300-1400	Caribbean	Montsinery
11675	2100-2130	Caribbean(M-F only)	Bonaire
15390	2100-2200	Caribbean	Montsinery
5975	2200-0100	Caribbean	Montsinery
	0200-0300	South America	Montsinery
	0300-0400	Central America	Delano
9825	0200-0300	South America	Ascension
12095	0200-0300	South America	Skelton

N.B. No transmission 0100-0200.

Source: BBC World Service

The full Americas stream 24/7 is available to subscribers of XM satellite radio. And, of course as the BBC often reminds us, their programs are available 24/7 via the internet and by subscription to Sirius satellite radio, which carries a stream specifically contracted for by Public Radio International. PRI, in turn, offers this stream, which is heavily weighted toward news, to public radio stations around the country, and many affiliates do relay the BBC overnight and much more sporadically

Chart 2: Other BBCWS Streams & Frequencies

Monitored Regularly at Halfmoon, NY

Freq kHz	UTC	Relay Station	Stream
21470	1400-1900	Ascension	East/Southern African
12095	1600-1900	Wooferton	European
	1900-2100	Ascension	East/Southern African
9410	1800-2100	Cyprus	European
17830	1800-2100	Ascension	West/Central African
15400	1800-2300	Ascension	West/Central African
6195	0400-0600	Rampisham	European
7160	0400-0600	Ascension	West/Central African

Also check 9410 from time to time.

Chart 3: BBCWS to North America Via DRM

UTC	Freq kHz	Transmitter	Beam	Power
2300-0000	9800	Sackville	268	70kW
0300-0400	11955	Sackville	268	70kW

Source: DRM Consortium

radios will be available for purchase by fall 2005 in time for the huge Berlin consumer electronics show, the IFA. The initial market, according to VT Communications' February *DRM Newsletter*, will be Germany, France and the Benelux countries. Some observed trends do support this statement, as there is a growing cluster of DRM broadcasting activity targeting this region. Hopefully, North America will not be too far behind.

❖ This is the VOA in Hong Kong

On April 11, the Voice of America's Director David Jackson made an announcement that on the surface would appear to simply reflect new realities in a globalized, 24 hour business world. He announced that, for seven hours a day – midnight to 7 a.m. Washington time – primary news operations are to be transferred to Hong Kong.

A statement from the VOA's Office of External Affairs described the move as a step to expand the VOA's presence in Asia, stating the obvious point that the region is an increasingly important one for the broadcaster. "We believe that the move will position VOA to offer better and faster-reacting coverage of news from Hong Kong, and the rest of East Asia. The move will also include adding internet staff in Hong Kong who will enable VOA to update its web presence 24 hours a day, something that is sorely needed."

As announced, the plan is to hire three editors and five writers "as contractors" in Hong Kong to handle the news operations there. "Stories produced in Hong Kong will be edited by full time staff currently based there and also overseen and vetted by their counterparts who will remain on the midnight shift in Washington," where final editorial responsibility will remain.

The statement stresses that the VOA's brand new state of the art multimedia newsroom in Washington "is not exactly going dark" during those overnight hours, though the employees previously assigned there for news operations during that time will be moved to other day and evening shifts.

It's also pointed out that the VOA has long had a bureau in Hong Kong, a city that "has a skilled local English-speaking workforce of journalists" and, like other broadcasters, has used foreign stringers around the world for many years. "Although this shift will result in a small savings, that is not the main point of the move. It is rather to extend and enhance our presence in Asia, assure quality coverage during Washington's overnight hours, and achieve true 24-hour web coverage," the statement concludes.

So, What Could Be Wrong Here?

Maybe nothing; but, on the other hand, maybe there are grounds for suspicion. For one thing, prominent and trusted individuals like Alan Heil, a former VOA deputy director and author of "The Voice of America, A History," and Sanford Unger, who recently served as VOA Director after a career in public and commercial broadcasting, are expressing misgivings.

For another, since 1999 the U.S. Broadcasting Board of Governors, which oversees VOA, has cut the number of its worldwide shortwave frequencies in English from 354 to 52. VOA English broadcasts can no longer be heard in Latin America or Europe (East and West) and are barely audible in the Middle East. And staff of the BBG have gone on record as stating the rather incredible opinion that English, the universal language of trade and commerce, is now largely irrelevant to U.S. international broadcasting and public diplomacy interests.

It is that last point that Unger highlighted as particularly misguided in an interview on NPR's *All Things Considered* on April 16. VOA has reduced availability of its news and other fare in English to only 16 hours a day at the same time as broadcasters like the BBC, DW and China Radio International are offering around-the-clock coverage.

Heil cites recent history, warning that relocating VOA central news operations in what remains, after all, the Peoples' Republic of China (PRC) for nearly a third of each day poses significant risks. In the event of another Tiananmen uprising or a Beijing assault on Taiwan, the Chinese regime could shut down in a flash VOA's worldwide news service, which still serves around 100 million listeners weekly and hundreds of FM and TV affiliates around the world – either by cutting communications or by expelling staff. In June 1989, the China expelled two VOA Beijing correspondents after the Tiananmen massacre and – to this day – China vigorously jams VOA broadcasts into China. In that light, this hardly seems a prudent move, especially without some robust back-up plans in place.

As an isolated event, this move probably would not merit more than a routine level of scrutiny. However, when seen in the context of a series of actions taken by the BBG over the last five years or so, the proposed outsourcing of news services to PRC-based contractors appears to be the latest in a series of measures aimed at dismantling the VOA and its global reach. It further calls into question the commitment of the BBG to the journalistic principles enunciated in the VOA Charter, which carry the force of law; but which do not legally apply to the growing panoply of surrogate broadcasters overseen by the BBG.

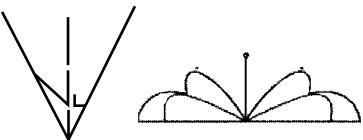
That suspicion is reinforced when the VOA Office of External Affairs cites the unpopularity of the overnight shift with staff, the obstacle that an overnight shift presents to

recruitment efforts, and the already-in-place communications connectivity between Washington and Hong Kong as further supporting rationale. As true as these points might be, they hardly serve as convincing arguments for virtually shutting down VOA headquarters and its central newsroom for seven hours a day. Neither does redirected cost savings of \$300,000 in a \$168 million budget.

Why Should You Care?

Well, you pay the taxes and these moves are all being made in your name. You're also a shortwave listener, more aware than most of international affairs and the role of broadcasting in it, and uniquely placed to offer informed perspective on the subject. The VOA is your international broadcaster and the only one strictly governed under force of law by principles for which some of your relatives and friends literally fought – and, in some cases, died. Things like truth, accuracy and objectivity in journalism.

Isn't it time your voice was heard – in online listener forums, in Washington by your senators and congressional representative, and in the letters section of this magazine – about all this?



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Best obstruction-penetrating
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Grove Enterprises 800-438-8155
www.grove-ent.com
Universal Radio 800-431-3939
www.universal-radio.com

Daniel Sampson's PRIME TIME SHORTWAVE

<http://www.primetimeshortwave.com>

Your guide for up-to-date English shortwave schedules sorted by time, country and frequency plus a DX media program guide and newsletter

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for more out of each issue!

Most Wanted QSL List

Here's an idea you can try to bring those tough replies closer to a resolution. After a number of attempts to verify a tough one, you're an expert at what doesn't work and the more desirable the QSL becomes!

Take the especially tough ones, and create a "Most Wanted" list to work from, usually around ten stations. Place the list near your receiver or a bulletin board at your listening post. By placing the list where it is visible, you're likely to be reminded to think about those stations more frequently. As a result, you may come up with new approaches to try or send follow-ups more often. Keep up to date on QSL policies here in *Monitoring Times* or club bulletins. Both represent the current trends and "what's working."

This "most-wanted" approach is very effective. Collectors tell

me it makes them more determined to succeed and that alone can bring positive results. When you do verify one from your list, don't replace it with another station. Just scratch it off and keep working down your list. Watching the "most wanted" stations go down in number is more encouraging than retaining a full list of ten or twelve stations. When the number is down to three or four you can replenish the list and begin again.

Keep an eye on those stations who haven't answered with a tracking sheet. Here you'll know what techniques have been tried on the station and when your last attempt was made. You may discover from the tracking sheet some stations that require their own page of reporting history!

Let us know how your Most Wanted QSL List worked. We always appreciate feedback from our contributors.

ARMENIA

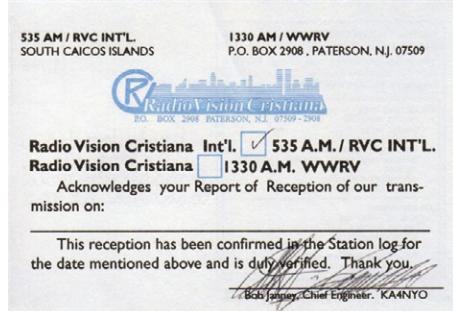
Voice of Armenia, 9960 kHz. Full data QSL and letter signed by Armen Amirian-Station Director, plus sticker. Received in 145 days for an English report and two IRCS. Station address: Alex Manoogian St. 5, Yerevan 375025, Republic of Armenia. (Ben Loveless, Bloomfield Hills, MI)

CHINA

Voice of Jinling, 5860 kHz. Full data scenery card with Chinese text, unsigned. Received in 25 days for an English report and one US dollar. Station address: P.O. Box 268, Nanjing, Jiangsu 210002, China. (Scott R. Barbour, Intervale, NH)

MEDIUM WAVE

Turks and Caicos Island. Radio Vision Cristiana 530 kHz AM. Full data verification form letter signed by Peter Polanco-Chief Engineer. Received in 26 days for an AM report, address label (used) and one US dollar. Station address: P.O. Box 2908, Paterson, NJ 07509-2908. (Bill Wilkins, Springfield, MO)



JCA 930 kHz AM. No data letter signed by Lynda Johnson, plus two window stickers and program schedule. Letter confirms station format as Southern Gospel music, talk and religion, with slogan as The Light. Received for an AM report. Station address: 4207-98 Street, Suite 204, Edmonton AB, Canada T6E 5R7. (Patrick Griffith,

Westminster, CO

KASL, 1080 kHz AM. Handwritten verification signed by Hazel Powell-Office Manager, plus station stickers. Received in seven days for AM report. Station address: 163 East 100 North, Price, UT 84501. (Patrick Martin, Seaside, OR)

KKDD, 1290 kHz AM. Second full data logo card this week, plus letter signed by Mike Escarcega-Operations Manager. Received in 21 days for an AM report and returned my QSL form letter with QSL. Station address: 2001 Iowa Avenue # 200, Riverside, CA 92507. (Martin, OR)

KOMJ, 590 kHz AM. Partial data letter on Journal Broadcast Group letterhead, signed by Paul Sjodin-Engineer. Received in ten days for an AM report, address label (not used) and one US dollar. Station address: 5030 N. 72nd Street, Omaha, NE 68134-2363. (Wilkins, MO)

KVNS, 1700 kHz AM. Full data letter on Clear Channel letterhead, signed by John Munoz-IT Manager, Engineering. Received in 38 days for an AM report and one US dollar. Station address: 901 E. Pike Blvd., Weslaco, TX 78596. (Wilkins, MO)

KWFS, 1290 kHz AM. No data Clear Channel logo note card signed by Jim-General Manager (illegible surname). Received for an AM report. Station address: 2525 Kell Blvd # 200, Wichita Falls, TX 76308. (Griffith, CO)

WFIL, 560 kHz AM. Nice QSL card signed by René Tetro-Chief Engineer. Received in 60 days for an AM report. Station address: 117 Ridge Pike, Lafayette Hill, PA 19444 Station is one of my best domestic catches heard using an emergency antenna. Philadelphia stations on medium wave are not an easy catch on the West Coast of North America. (Martin, OR)

NORTHERN MARIANAS

Radio Free Asia via Tinian, 15510 kHz. Full data Year of the Rooster card without site or signature, plus bum-

per sticker and letter signed by A.J. Janitschek. Received in 23 days for an English report. Station address: Radio Free Asia, 2025 M. Street NW, Suite 300, Washington, DC 20036. (Wilkins, MO)

PIRATE

The Crystal Ship, 6857 kHz. Full data card # B-43 signed by The Poet, plus pennant and copy of On Board the Crystal Ship interview. Received in twelve days for an email report to: csshortwave@yahoo.com. (Kraig Krist KG4LAC, Annandale, VA)

SPAIN

Radio Exterior España 595 kHz. Verification on station letterhead unsigned, plus Carnaval stickers. Received in 15 days for a Spanish report. QSL address: Programa "Españoles en la Mar," Apartado Postal 1233, Santa Cruz de Tenerife, Spain. (Dan Malloy, Everett, MA)

TAIWAN

Radio Australia relay via Taipei, 11550 kHz. Full data card of Shepparton International High Frequency transmission station, signed by Sam Johnson. Received in 180 days for a Bahasa-Indonesian report. Station address: GPO Box 9994, Melbourne, Victoria 3006, Australia. (Arnaldo Slaen, Buenos Aires, Argentina)

UAE

Adventist World Radio, 15385 kHz. Full data "AWR-VOH" card signed by A. Kaibe. Received in 79 days for an English report and one IRC. QSL states site as "Agat, Guam," although all references and schedule accompanying QSL indicate UAE. QSL was mailed from AWR-Asia/Pacific regional office in Singapore, while I mailed my report to the Voice of Hope-China, Kowloon, Hong Kong, address as requested during the program. Reports should be sent to: AWR, 39 Brendon Street, London W1H 5HD United Kingdom. (Barbour, NH)



How to Use the Shortwave Guide

0000-0100 twhfa	USA, Voice of America	5995am	6130ca	7405am	9455af
① ② ⑤	③ ④	⑥ ⑦			

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

MT MONITORING TEAM

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Daniel Sampson
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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

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Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meters
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes

Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.

Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.

Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.

Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

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0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0015	vl	Cambodia, National Radio	11940as	
0000	0015		Japan, Radio 17825na	13650as	17810as
0000	0027		Czech Rep, Radio Prague Intl	7345na	9440na
0000	0030		Australia, Radio 15240pa	12080as	13630pa
0000	0030		Burma, Dem Voice of Burma	17750pa	17775pa
0000	0030		Egypt, Radio Cairo	9435eu	
0000	0030		Serbia & Montenegro, Intl Radio	9580va	
0000	0030	twhfas	Thailand, Radio	9570va	
0000	0030		UK, BBC World Service	3915as	5970as
			6195as 9410as	11945as	11955as
			15280as	15360as	17655as
			17790as		
0000	0030		USA, Voice of America	7215va	12140as
0000	0045		15185va	15290va	
0000	0045		India, All India Radio	9705as	
			11645as	9950as	11620as
0000	0057		Australia, ABC NT Alice Springs		
0000	0059		Australia, ABC NT Katherine		
0000	0100		Australia, ABC NT Tennant Creek		
0000	0100		Australia, HCJB	15525as	
0000	0100		Canada, CBC Northern Service	9625do	
0000	0100		Canada, CFRX Toronto ON	6070do	
0000	0100		Canada, CFVP Calgary AB	6030do	
0000	0100		Canada, CKZN St John's NF	6160do	
0000	0100		Canada, CKZU Vancouver BC	6160do	
0000	0100		Canada, Radio Canada Intl	9755am	11990am
			13710am		
0000	0100		Costa Rica, University Network	5030va	6150va
			7375va 9725va		
0000	0100		Germany, Deutsche Welle	7130as	9505as
			9825as		
0000	0100		Guyana, Voice of	3290do	
0000	0100		Malaysia, Radio	7295as	
0000	0100	vl	Namibia, Namibian BC Corp	3270do	3290do
0000	0100		6060do	6175do	
0000	0100		Netherlands, Radio	9845na	
0000	0100		New Zealand, Radio NZ Intl	15720pa	
0000	0100		Sierra Leone, Radio UNAMSIL	6137do	
0000	0100		Singapore, Mediacorp Radio	6150do	
0000	0100	DRM	UK, BBC World Service	6010am	
0000	0100		UK, BBC World Service	5975am	
0000	0100		Ukraine, Radio Ukraine Intl	7440na	
0000	0100		USA, AFRTS	4319usb	5765usb
			7590usb	5446usb	12133usb
			12133usb	7812usb	12579usb
				12579usb	13362usb
				13855usb	
0000	0100		USA, KAJI Dallas TX	5755na	
0000	0100		USA, KTBN Salt Lake City UT	7505na	
0000	0100		USA, KWHR Naalehu HI	17510as	
0000	0100		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5810va	5825va
			7425va 11530va		
0000	0100	mtwhf	USA, WHRA Greenbush ME	7520na	
0000	0100	as	USA, WHRI Noblesville IN	7490am	9515am
0000	0100		USA, WHRI Noblesville IN	7315am	
0000	0100		USA, WIND Red Lion PA	9320am	
0000	0100		USA, WJIE Louisville KY	13595am	
0000	0100		USA, WRMI Miami FL	6870am	9955am
0000	0100		USA, WRMI Miami FL	6870am	9955am
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCR Nashville TN	3210na	5070na
			7465na 13845na		
0000	0100		USA, WWRB Manchester TN	3185na	5050na
			5085na 5745na	6890na	
0000	0100		USA, WYFR Okeechobee FL	6065na	9505as
			11835na	17805na	
0000	0100		Zambia, Radio Christian Voice	4965af	
0000	0157		China, China Radio Intl	6020al	6075as
0030	0045	s	7180as 7345eu	9570al	
0030	0100		Germany, Pan American BC	9740as	
			15240pa	12080as	13630pa
			15415pa	17715as	17750pa
			17775as		
0030	0100	mtwhfs	Germany, Bible Voice Broadcasting	6010as	
0030	0100		Lithuania, Radio Vilnius	9875na	
0030	0100		Sri Lanka, SLBC	6005as	11905as
0030	0100		Thailand, Radio	5890na	13595na
0030	0100		UK, BBC World Service	5970as	6195as
			9410as 9740as	11955as	15280as
			15360as	17790as	15310as
0030	0100		USA, Voice of America	7215va	9780va
			11760va	15185va	17740va

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT			
0035 0100	sm	17820va	Austria, Radio Austria Intl
0043 0058	twhfa		Austria, Radio Austria Intl
0045 0100			Pakistan, Radio 9340as
0055 0100			Italy, RAI Intl 11800na
0100 0115			Italy, RAI Intl 11800na
0100 0115			Pakistan, Radio 9340as
0100 0127			Czech Rep, Radio Prague Intl 11565as
0100 0128			Hungary, Radio Budapest 6200na
0100 0128			Vietnam, Voice of 9560na
0100 0129	s		Germany, Universal Life 7345na
0100 0130			Australia, Radio 9660as
		15240pa	12080as
		17775as	13630pa
			15415pa 17750pa
0100 0130	mwfa	5970eu	17715as
0100 0130		5930na	7210eu
0100 0130		7190as	5930na
0100 0157		6020na	9440am
0100 0157	DRM	15525na	9715as
0100 0159		13710am	9570na
0100 0200			Netherlands, Radio 11990am
0100 0200			Canada, Radio Canada Intl
0100 0200			13710am
0100 0200			Anguilla, Caribbean Beacon
0100 0200			Australia, ABC NT Katherine
0100 0200			Australia, ABC NT Tenant Creek
0100 0200			Australia, HCJB 4910do
0100 0200			Australia, Voice Intl 15560as
0100 0200			Australia, Voice Intl 7355as
0100 0200			Canada, CBC Northern Service
0100 0200			Canada, CFRX Toronto ON
0100 0200			Canada, CFVP Calgary AB
0100 0200			Canada, CKZN St John's NF
0100 0200			Canada, CKZU Vancouver BC
0100 0200			Costa Rica, University Network
		7375va	6150va
		9725va	
0100 0200		6000na	9820na
0100 0200		3291do	
0100 0200		9525as	11785pa
0100 0200		5960as	15150al
		153235as	11860as
		17560va	9440am
		17825ca	9715as
		17845as	11935sa
0100 0200	vl	7295as	17810as
0100 0200		6060do	6175do
0100 0200		9845na	3270do
0100 0200		11735am	3290do
0100 0200			Netherlands, Radio
0100 0200			New Zealand, Radio NZ Intl
0100 0200			North Korea, Voice of
		9730am	9345as
		11735am	15180as
0100 0200			Romania, Radio Romania Intl
		11820na	9690na
		15430na	
0100 0200			Russia, Voice of
		7180na	9665na
		15545na	17660na
		15595na	
0100 0200			Sierra Leone, Radio UNAMSIL
0100 0200			Singapore, Mediacorp Radio
0100 0200			Sri Lanka, SLBC 6137do
0100 0200			UK, BBC World Service 6150do
		11955as	11905as
		15280as	15310as
0100 0200		4319usb	17790as
		7590usb	5446usb
		7812usb	5765usb
		12133usb	12133usb
		12579usb	12579usb
0100 0200		5755na	13362usb
0100 0200		5755na	13855usb
0100 0200		5755na	
0100 0200		17510as	
0100 0200		7115va	9885va
0100 0200		11725va	
0100 0200		5105na	7415na
0100 0200		5920am	
0100 0200		5810va	5825va
0100 0200	mtwhf		USA, WHRA Greenbush ME
0100 0200	as		USA, WHRI Noblesville IN
0100 0200			USA, WHRI Noblesville IN
0100 0200			USA, WINB Red Lion PA
0100 0200			USA, WJIE Louisville KY
0100 0200			USA, WRMI Miami FL 6870am
0100 0200			USA, WTJC Newport NC
0100 0200			USA, WWCR Nashville TN
		5935na	5935na
		7465na	7465na
0100 0200		6890na	6890na
0100 0200		5085na	5085na
		5745na	5745na
		6890na	6890na
0100 0200		6065na	6065na
0100 0200		4965af	9505as
0105 0130	sm	Zambia, Radio Christian Voice	
0113 0130	twhfa	Austria, Radio Austria Intl	
0115 0130	a	Austria, Radio Austria Intl	
0130 0200		Austria, Radio Austria Intl	
		9870sa	
		9870sa	
		12080as	13630pa
		15415pa	17750pa

Shortwave Guide



0130	0200	s	Belarus, Radio	5970eu	7210eu	11875am
0130	0200		Iran, Voice of the Islamic Rep	9495am		
0130	0200		Sweden, Radio	6010na	9435va	
0130	0200	twhfa	USA, Voice of America	13740va	7405va	9775va
0133	0200	sm	Austria, Radio Austria Intl	9870me		
0143	0158	twhfa	Austria, Radio Austria Intl	9870na		
0145	0158	twhfas	Albania, Radio Tirana	6115eu	7160eu	

0230	0258	Vietnam, Voice of	6175na
0230	0300	Sweden, Radio	6010na
0245	0300	Myanmar, Radio	9730do
0250	0300	Vatican City, Vatican Radio	7305am
			9605am

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0230		Austria, AWR Europe	9895as		
0200	0230	mtwhfa	Belarus, Radio	5970eu	7210eu	
0200	0230	vl	Croatia, Croatian Radio	9925sa		
0200	0230		Iran, Voice of the Islamic Rep	9495am	11875am	
0200	0230	a	UK, Wales Radio Intl	9795sa		
0200	0257		China, China Radio Intl	13640as	11770as	
0200	0300		Anguilla, Caribbean Beacon	6090am		
0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs	2310irr	4835do	
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek	4910do		
0200	0300		Australia, Radio	9660as	12080as	13630pa
0200	0300		Australia, Radio	15240pa	15415pa	17750pa
0200	0300		Australia, Radio	21725pa		
0200	0300		Australia, Voice Intl	7355as		
0200	0300		Bulgaria, Radio	9700na	11700na	
0200	0300		Canada, CBC Northern Service	9625do		
0200	0300		Canada, CFRX Toronto ON	6070do		
0200	0300		Canada, CFVP Calgary AB	6030do		
0200	0300		Canada, CKZN St John's NF	6160do		
0200	0300		Canada, CKZU Vancouver BC	6160do		
0200	0300		Costa Rica, University Network	5030va	6150va	
0200	0300		Cuba, Radio Havana	6000na	9820na	
0200	0300		Egypt, Radio Cairo	7260na		vl
0200	0300		Guyana, Voice of	3291do		
0200	0300		Malaysia, Radio	7295as		
0200	0300	vl	Namibia, Namibian BC Corp	3270do	3290do	
0200	0300		6060do	6175do		
0200	0300		New Zealand, Radio NZ Intl	15720pa		
0200	0300		North Korea, Voice of	4405as	13650as	
0200	0300		15100as			
0200	0300		Philippines, Radio Pilipinas	11885va	15120va	
0200	0300		15270va			
0200	0300		Russia, Voice of	5945me	7180na	9665na
0200	0300		9860na15545na	15595na	17660na	
0200	0300		Sierra Leone, Radio UNAMSIL	6137do		
0200	0300		Singapore, Mediacorp Radio	6150do		
0200	0300		South Korea, Radio Korea Intl	9560va	11810sa	
0200	0300		15575va			
0200	0300		Sri Lanka, SLBC	6005as	11905as	
0200	0300		Taiwan, Radio Taiwan Intl	11875as	15465as	
0200	0300		12133usb	12579usb	13362usb	13855usb
0200	0300		UK, BBC World Service	5975am	9750as	
0200	0300		9825am	11760me	11955as	12095am
0200	0300		15280as	15310as	15360as	17790as
0200	0300		USA, AFRTS	4319usb	5446usb	5765usb
0200	0300		7590usb	7812usb	12133usb	12579usb
0200	0300		12133usb	12579usb	13362usb	13855usb
0200	0300		USA, KAJI Dallas TX	5755na		
0200	0300		USA, KJES Vado NM	7555na		
0200	0300		USA, KTBN Salt Lake City UT	7505na		
0200	0300		USA, KWHR Naalehu HI	17510as		
0200	0300	mtwhf	USA, Voice of America	7115va	9885va	
0200	0300		11705va	11725va		
0200	0300		USA, WBCQ Kennebunk ME	5105na	7415na	
0200	0300		9330na			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Birmingham AL	5810va	5825va	
0200	0300		7425va11530va			
0200	0300		USA, WHRA Greenbush ME	5850na		
0200	0300	mtwhf as	USA, WHRI Noblesville IN	7490am	9515am	
0200	0300		USA, WHRI Noblesville IN	7315am		
0200	0300		USA, WINB Red Lion PA	9320am		
0200	0300		USA, WJIE Louisville KY	13595am		
0200	0300		USA, WRMI Miami FL	6870am		
0200	0300		USA, WTJC Newport NC	9955am		
0200	0300		USA, WWCR Nashville TN	9370na		
0200	0300		5935na7465na	6890na		
0200	0300		5985na5745na	6890na		
0200	0300		5950na11835na	11855na		
0200	0300		Zambia, Radio Christian Voice	4965af		
0215	0230		Nepal, Radio	3230as	5005as	6100as
0215	0230		7165as			
0230	0258	twhfas	Albania, Radio Tirana	6115eu	7160eu	
0230	0258		Hungary, Radio Budapest	9795na		

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0327	Czech Rep, Radio Prague Intl	7345na	9870na
0300	0330	Egypt, Radio Cairo	7260na	
0300	0330	Myanmar, Radio	9730do	
0300	0330	Philippines, Radio Pilipinas	11885va	15270va
0300	0330	15270va		
0300	0330	Thailand, Radio	5890na	15460na
0300	0330	USA, KJES Vado NM	7555na	
0300	0330	USA, Voice of America	4930af	6080af
0300	0330	7290af 7340af	9885af	12080af
0300	0330	Vatican City, Vatican Radio	7360af	
0300	0330	Turkey, Voice of	6140va	7270va
0300	0335	South Africa, Channel Africa	6150af	
0300	0355	China, China Radio Intl	7190na	9690na
0300	0357	9790na11770as	15110as	
0300	0400	Anguilla, Caribbean Beacon	6090am	
0300	0400	Australia, ABC NT Alice Springs	2310irr	
0300	0400	Australia, ABC NT Katherine	5025do	
0300	0400	Australia, ABC NT Tennant Creek	4910do	
0300	0400	Australia, Radio	9660as	12080as
0300	0400	15240pa	15415pa	13630pa
0300	0400	21725pa	17750pa	
0300	0400	Costa Rica, University Network	5030va	6150va
0300	0400	7375va9725va		
0300	0400	Cuba, Radio Havana	6000na	9820na
0300	0400	Guatemala, Radio Cultural		3300sa
0300	0400	Guyana, Voice of	3291do	
0300	0400	Japan, Radio	21610pa	
0300	0400	Malaysia, Radio	7295as	
0300	0400	Malaysia, Voice of	6175as	9750as
0300	0400	Namibia, Namibian BC Corp	6060do	3270do
0300	0400	6175do		3290do
0300	0400	New Zealand, Radio NZ Intl	15720pa	
0300	0400	North Korea, Voice of	9345as 9730as	
0300	0400	9730as		
0300	0400	Oman, Radio	15335as	
0300	0400	Russia, Voice of	5900na	7180na
0300	0400	9860na15545na	15595na	17660na
0300	0400	Rwanda, Radio	6055do	
0300	0400	Sierra Leone, Radio UNAMSIL	6055do	
0300	0400	Singapore, Mediacorp Radio	6150do	
0300	0400	South Africa, Channel Africa	3345af	
0300	0400	Sri Lanka, SLBC	6005as	11905as
0300	0400	Taiwan, Radio Taiwan Intl	15745as	
0300	0400	15320va		
0300	0400	Uganda, Radio	4976do	5026do
0300	0400	UK, BBC World Service	3255af	5975am
0300	0400	6005af 6190af	6195eu	
0300	0400	9750af 11760me	17760as	
0300	0400	12095as	15280as	
0300	0400	15575me	17760as	
0300	0400	Uganda, Sudan Radio Service	9625va	
0300	0400	Ukraine, Radio Ukraine Intl	7440na	
0300	0400	USA, AFRTS	5446usb	5765usb
0300	0400	7590usb	7812usb	
0300	0400	12133usb	12579usb	
0300	0400	13362usb	13855usb	
0300	0400	13855usb		
0300	0400	UK, Sudan Radio Service	9625va	
0300	0400	Ukraine, Radio Ukraine Intl	7440na	
0300	0400	USA, AFRTS	5446usb	5765usb
0300	0400	7590usb	7812usb	
0300	0400	12133usb	12579usb	
0300	0400	13362usb	13855usb	
0300	0400	13855usb		
0300	0400	USA, KAJI Dallas TX	5755na	
0300	0400	USA, KTBN Salt Lake City UT	7505na	
0300	0400	USA, KWHR Naalehu HI	17510as	
0300	0400	USA, WBCQ Kennebunk ME	5105na	7415na
0300	0400	9330na		
0300	0400	USA, WBOH Newport NC	5920am	
0300	0400	USA, WEWN Birmingham AL	5810va	5825va
0300	0400	7425va11530va		
0300	0400	USA, WHRA Greenbush ME	5850na	
0300	0400	USA, WHRI Noblesville IN	5835am	7465am
0300	0400	USA, WHRI Noblesville IN	7315am	
0300	0400	USA, WINB Red Lion PA	9320am	
0300	0400	USA, WJIE Louisville KY	13595am	
0300	0400	USA, WRMI Miami FL	6870am	
0300	0400	USA, WTJC Newport NC	9955am	
0300	0400	USA, WWCR Nashville TN	9370na	
0300	0400	5935na5935na	6890na	
0300	0400	USA, WWRB Manchester TN	3185na	5050na
0300	0400	5085na5745na	6890na	
0300	0400	USA, WYFR Okeechobee FL	11740na	15255na
0300	0400	11740na	15255na	
0300	0400	15255na		
0300	0400	USA, WYFR Okeechobee FL	11740na	15255na
0300	0400	15255na		
0300	0400	Zambia, Radio Christian Voice	4965af	
0300	0400	Nepal, Radio	5005as	
0300	0400	7165as		
0300	0400	Albania, Radio Tirana	6115eu	
0300	0400	Hungary, Radio Budapest	9795na	
0300	0400	9795na		

Shortwave Guide



0330 0345	Hungary, Radio Budapest	6025eu	9655eu	0430 0500	Nigeria, Radio/Ibadan	6050do
0330 0345	Israel, Kol Israel 17600va	9345va	11605va	0430 0500	Nigeria, Radio/Kaduna	4770do
0330 0357	Czech Rep, Radio Prague Intl	9445va	11600va	0430 0500	Nigeria, Radio/Lagos 3326do	4990do
0330 0358	Vietnam, Voice of 6175am			0430 0500	Serbia & Montenegro, Intl Radio	9580va
0330 0400	UAE, Emirates Radio 12005na	13675na	15400na	0430 0500	Swaziland, TWR 3200af	4775af
0330 0400 mtwhf	USA, Voice of America 17895af	7290af	12080af	0430 0500	USA, Voice of America 7290af 9575af	4930af
0330 0400	USA, Voice of America 9885af	4930af	6080af	0445 0500	11835af	12080af
0445 0500	Italy, RAI Intl			0459 0500	6110af	7235af
0459 0500	New Zealand, Radio NZ Intl					9800af
						11820pa

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400 0430	Australia, Radio 15240pa	9660as	12080as	13630pa
0400 0430	France, Radio France Intl	15515pa	17750pa	
0400 0430	Sri Lanka, SLBC	7315af	11700af	
0400 0430	USA, Voice of America	6005as	15745as	
	6080af 7290af	9575af	11835af	
	12080af 17895af	9885af	11835af	
0400 0457	China, China Radio Intl	9755na	6190na	9560na
0400 0457 DRM	Netherlands, Radio	15400au	15720pa	
0400 0458	New Zealand, Radio NZ Intl	15515pa		
0400 0500	Anguilla, Caribbean Beacon	6090am	4835do	
0400 0500	Australia, ABC NT Alice Springs	2310irr		
0400 0500	Australia, ABC NT Katherine	5025do		
0400 0500	Australia, ABC NT Tennant Creek	4910do		
0400 0500	Canada, CBC Northern Service	9625do		
0400 0500	Canada, CFRX Toronto ON	6070do		
0400 0500	Canada, CKZN St John's NF	6160do		
0400 0500	Canada, CKZU Vancouver BC	6160do		
0400 0500	Costa Rica, University Network	5030va	6150va	
	7375va 9725va			
0400 0500	Cuba, Radio Havana	6000na	9820na	
0400 0500	Germany, Deutsche Welle	15445as	7170af	11945as
0400 0500	Guyana, Voice of	3291do		
0400 0500	Malaysia, Radio	7295as		
0400 0500	Malaysia, Voice of	6175as	9750as	15295as
0400 0500 vl	Namibia, Namibian BC Corp	3270do	3290do	
	6060do	6175do		
0400 0500	Netherlands, Radio	6165na	9590na	
0400 0500	Nigeria, Radio/Kaduna	6090do		
0400 0500	Romania, Radio Romania Intl	9780va	11820va	
	15140va	17860va		
0400 0500	Russia, Voice of	5900na	7180na	15545na
	15595na	17660na		
0400 0500 vl	Rwanda, Radio	6055do		
0400 0500	Sierra Leone, Radio UNAMSIL	6137do		
0400 0500	Singapore, Mediacorp Radio	6150do		
0400 0500	South Africa, Channel Africa	3345af		
0400 0500 vl	Uganda, Radio	4976do	5026do	7196do
0400 0500 DRM	UK, BBC World Service	6010na		
0400 0500	UK, BBC World Service	3255af	6005af	
	6195eu 7160af	9410va	11760eu	9410va
	11760me	11765af	12035af	15310as
	15280as	15360as	15420af	15575me
	17760as	17790as	21660as	
0400 0500 vl/ mtwhf	UK, Sudan Radio Service	9625va		
0400 0500	USA, AFRTS	4319usb	5446usb	5765usb
	7590usb	7812usb	12133usb	12579usb
	12133usb	12579usb	13362usb	13855usb
0400 0500	USA, KAIJ Dallas TX	5755na		
0400 0500	USA, KTBN Salt Lake City UT	7505na		
0400 0500	USA, KWHR Naalehu HI	17510as		
0400 0500	USA, WBCQ Kennebunk ME	5105na	7415na	
	9330ha			
0400 0500	USA, WBOH Newport NC	5920am		
0400 0500	USA, WEWN Birmingham AL	5810va	5825va	
	7425va 11530va			
0400 0500 mtwhf	USA, WHRA Greenbush ME	5850na		
0400 0500 as	USA, WHRI Noblesville IN	5835am	7465am	
0400 0500 as	USA, WHRI Noblesville IN	5835am		
0400 0500	USA, WINB Red Lion PA	9320am		
0400 0500	USA, WJIE Louisville KY	13595am		
0400 0500	USA, WMLK Bethel PA	9265eu	9955eu	
0400 0500	USA, WRMI Miami FL 6870am	9955am		
0400 0500	USA, WTJC Newport NC	9370na		
0400 0500	USA, WWCR Nashville TN	3210na	5070na	
	5935na 5935na			
0400 0500	USA, WWRB Manchester TN	3185na	5050na	
	5085na 5745na	6890na		
0400 0500	USA, WYFR Okeechobee FL	6065na	6855eu	
	7355eu 9505eu	9715eu		
0400 0500 vl	Zambia, Radio Christian Voice	4965af		
0400 0500 vl	Zimbabwe, ZBC Corp 5975do			
0430 0500	Australia, Radio	9660as	12080as	13630pa
	15240pa	15415pa	15515va	17750pa

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500 0520	Vatican City, Vatican Radio	4005eu	5890eu
0500 0530	Australia, Radio	9660as	13630pa
	15160pa	15240pa	15515va
0500 0530	France, Radio France Intl	9825af	15160af
0500 0530 vl	Rwanda, Radio	6055do	
0500 0530	UK, BBC World Service	6005af	6190af
	7160af 11765af	11940af	11955me
	12035af	12095va	15280as
	15420af	15575me	15310as
	21660as	217760as	17790as
0500 0530	UK, BBC World Service	6005af	6195af
	7160af 9410va	11765af	11940af
	15280as	15310as	15360as
	17760as	17790as	17885af
0500 0530	Vatican City, Vatican Radio	7360af	9660af
	11625af		
0500 0555	South Africa, Channel Africa	9685af	
0500 0557	China, China Radio Intl	6190as	9515af
	11770as	11880as	15350as
	17540as		15465as
0500 0600	Anguilla, Caribbean Beacon	6090am	
0500 0600	Australia, ABC NT Alice Springs	2310irr	4835do
0500 0600	Australia, ABC NT Katherine	5025do	
0500 0600	Australia, ABC NT Tennant Creek	4910do	
0500 0600	Canada, CBC Northern Service	9625do	
0500 0600	Canada, CFRX Toronto ON	6070do	
0500 0600	Canada, CKZN St John's NF	6160do	
0500 0600	Canada, CKZU Vancouver BC	6160do	
0500 0600	Costa Rica, University Network	5030va	6150va
	7375va 9725va		
0500 0600	Cuba, Radio Havana	6000va	6060va
	11760va		9550va
0500 0600	Germany, Deutsche Welle	9630af	9700af
	15410af	17800af	
0500 0600	Guyana, Voice of	3291do	
	15195as	17810as	21755pa
0500 0600	Malaysia, Radio	5975eu	
	6175as		9750as
0500 0600	Namibia, Namibian BC Corp	6060do	6175do
	6060do	6175do	
0500 0600	New Zealand, Radio NZ Intl	11820pa	
0500 0600	Nigeria, Radio/Ibadan	6050do	
0500 0600	Nigeria, Radio/Kaduna	4770do	6090do
0500 0600	Nigeria, Radio/Lagos	3326do	
0500 0600	Nigeria, Voice of	15120af	
	17665pa		21790pa
0500 0600	Russia, Voice of	17665pa	
	17665pa		6137do
0500 0600	Sierra Leone, Radio UNAMSIL	5975eu	
	5975eu		6150do
0500 0600	Singapore, Mediacorp Radio	1240af	
	1240af		7240af
0500 0600	South Africa, Channel Africa	7240af	
	7240af		7240af
0500 0600	Swaziland, TWR	3200af	4775af
	3200af		9500af
0500 0600	Uganda, Radio	4976do	5026do
	4976do		7196do
0500 0600	UK, BBC World Service	6195eu	11760me
	11760me		
0500 0600	12095eu	15565eu	15575me
0500 0600	UK, Sudan Radio Service	11795va	
	11795va		
0500 0600	USA, AFRTS	5446usb	5765usb
	7590usb	7812usb	12133usb
	12133usb	12579usb	13362usb
	12579usb	13362usb	13855usb
0500 0600	USA, KAIJ Dallas TX	5755na	
0500 0600	USA, KTBN Salt Lake City UT	7505na	
	7505na		
0500 0600	USA, KWHR Naalehu HI	9510as	17510as
	9510as		
0500 0600	USA, Voice of America	4930af	6080af
	4930af		
0500 0600	6180af 7290af	12080af	13645af
0500 0600	USA, WBCQ Kennebunk ME	5105na	7415na
	9330na		
0500 0600	USA, WBOH Newport NC	5920am	
0500 0600	USA, WEWN Birmingham AL	5745va	7425va
	5745va		
0500 0600	5935na 5935na	11615va	
0500 0600	USA, WHRA Greenbush ME	7490na	
	7490na		
0500 0600	USA, WHRI Noblesville IN	7315am	7465am
	7315am		
0500 0600	USA, WJIE Louisville KY	13595am	
	13595am		
0500 0600	USA, WMLK Bethel PA	9265eu	9955eu
	9265eu		
0500 0600	USA, WRMI Miami FL 6870am	9955am	
	9955am		
0500 0600	USA, WTJC Newport NC	9370na	
	9370na		
0500 0600	USA, WWCR Nashville TN	3210na	5070na
	5070na		
0500 0600	5935na 5935na	11615va	
0500 0600	USA, WHRA Greenbush ME	7490na	
	7490na		
0500 0600	USA, WHRI Noblesville IN	7315am	7465am
	7315am		
0500 0600	USA, WJIE Louisville KY	13595am	
	13595am		
0500 0600	USA, WMLK Bethel PA	9265eu	9955eu
	9265eu		
0500 0600	USA, WRMI Miami FL 6870am	9955am	
	9955am		
0500 0600	USA, WTJC Newport NC	9370na	
	9370na		
0500 0600	USA, WWCR Nashville TN	3210na	5070na
	5070na		
0500 0600	5935na 5935na	11615va	
0500 0600	USA, WWRB Manchester TN	3185na	5050na
	5050na		
0500 0600	5085na 5745na	6890na	
0500 0600	USA, WYFR Okeechobee FL	6065na	6855eu
	6065na		
0500 0600	7355eu 9505eu	9715eu	
0500 0600	Zambia, Radio Christian Voice	4965af	
	4965af		
0500 0600	Zimbabwe, ZBC Corp 5975do		
0500 0600	Australia, Radio	9660as	
	9660as		
0500 0600	15240pa	15415pa	
	15415pa		
0500 0600	21725pa		
	21725pa		

Shortwave Guide

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0500 0600	5085na6890na	USA, WYFR Okeechobee FL	6855eu	9355eu	0600 0700	USA, WHRA Greenbush ME	7490na	7465am
0500 0600	Zambia, Radio Christian Voice	4965af			0600 0700	USA, WHRI Noblesville IN	7315am	
0500 0600 vl	Zimbabwe, ZBC Corp5975do				0600 0700	USA, WJIE Louisville KY	13595am	
0505 0520 m	Austria, Radio Austria Intl	17870me			0600 0700	USA, WMLK Bethel PA	9265eu	9955eu
0505 0530 as	Austria, Radio Austria Intl	17870me			0600 0700	USA, WRMI Miami FL 6870am	9955am	
0515 0600	Zambia, Radio Christian Voice	9555af			0600 0700	USA, WTJC Newport NC	9370na	
0525 0600 vl	Ghana, Ghana BC Corp	3366do	4915do		0600 0700	USA, WWCR Nashville TN	3210na	5070na
0530 0600	Australia, Radio 9660as	12080as	13630as			5935na5935na		
	15160pa	15240va	15415as	15515pa	0600 0700	USA, WYFR Okeechobee FL	5810eu	7355eu
	17750as				0600 0700	9680eu11530eu	11580eu	
0530 0600	Thailand, Radio 13780eu	17690va			0600 0700	Vanuatu, Radio 4960do		
0530 0600	UK, BBC World Service	6005af	6190af		0600 0700	Yemen, Rep of Yemen Radio	9780me	
	7160af 9410af	11765af	11940af	11955as	0600 0700	Zambia, Radio Christian Voice	9865af	
	15310as	15360as	15420af	17640af	0630 0700	Zimbabwe, ZBC Corp5975do		
	17760as	17790as	21660as		0630 0700	Bulgaria, Radio 11600eu	13600eu	
0530 0600 mtwhf	UK, BBC World Service	17885af			0630 0700	Germany, Bible Voice Broadcasting	5945eu	
0545 0600 twh	Austria, Radio Austria Intl	17870me			0630 0700	Romania, Radio Romania Intl	9655eu	11830eu
0545 0600 vl	Rwanda, Radio 6055do				0630 0700	Vatican City, Vatican Radio	9660af	11625af
					0645 0700	Albania, TWR 11865eu		
					0645 0700	Monaco, TWR 9870eu		

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600 0605 vl	Croatia, Croatian Radio	13820na						
0600 0615 as	South Africa, TWR 11640af							
0600 0630	France, Radio France Intl 17800af	11665af	15160af					
0600 0645 mtwhf	South Africa, TWR 11640af							
0600 0655	South Africa, Channel Africa	15440af						
0600 0657	China, China Radio Intl 11775al	6115na	11770as					
	11880as	15140as	15350as					
0600 0700	Anguilla, Caribbean Beacon	6090am						
0600 0700	Australia, ABC NT Alice Springs	2310irr	4835do					
0600 0700	Australia, ABC NT Katherine	5025do						
0600 0700	Australia, ABC NT Tennant Creek	4910do						
0600 0700	Australia, Radio 9660as	12080as	13630as					
	15160pa	15240va	15415as	15515pa				
	17750va							
0600 0700	Australia, Voice Intl 15335as							
0600 0700	Canada, CFRX Toronto ON	6070do						
0600 0700	Canada, CFVP Calgary AB	6030do						
0600 0700	Canada, CKZN St John's NF	6160do						
0600 0700	Canada, CKZU Vancouver BC	6160do						
0600 0700	Costa Rica, University Network 7375va 9725va	5030va	6150va					
	11870va							
0600 0700	Cuba, Radio Havana 6000va 11760va	6060va	9550va					
0600 0700	Germany, Deutsche Welle 15275af	6140eu	7170af					
	17860af				0700 0800	as		
0600 0700 DRM	Germany, Deutsche Welle	21675eu			0700 0800	DRM		
0600 0700 vl	Ghana, Ghana BC Corp	3366do	4915do		0700 0800	vl		
0600 0700	Guyana, Voice of 3291do				0700 0800	vl/as		
	Japan, Radio 7230eu	11715as	11740as		0700 0800			
	11760as	13630va	15195as	17870pa	0700 0800			
	21755pa				0700 0800			
0600 0700	Liberia, ELWA 4760do				0700 0800			
0600 0700	Malaysia, Radio 7295as				0700 0800	mtwhfa		
0600 0700	Malaysia, Voice of 6175as	9750as	15295as		0700 0800	vl		
0600 0700 vl	Namibia, Namibian BC Corp 6060do	3270do	3290do		0700 0800			
	6175do				0700 0800			
0600 0700	New Zealand, Radio NZ Intl	11820pa			0700 0800			
0600 0700	Nigeria, Radio/Ibadan	6050do			0700 0800			
0600 0700	Nigeria, Radio/Kaduna	4770do	6090do		0700 0800			
0600 0700	Nigeria, Radio/Lagos 3326do	4990do			0700 0800			
0600 0700	Nigeria, Voice of 15120af				0700 0800	DRM		
0600 0700	Russia, Voice of 17665pa	21790pa			0700 0800	irreg/ vl		
0600 0700 DRM	Russia, Voice of 15780eu				0700 0800			
0600 0700	Sierra Leone, Radio UNAMSIL 6137do				0700 0800			
0600 0700 irreg/ vl	Sierra Leone, SLBS 3316do				0700 0800			
	6150do				0700 0800			
0600 0700	Singapore, Mediacorp Radio 5020do	9545do			0700 0800			
0600 0700 vl	Solomon Islands, SIBC 7240af				0700 0800			
0600 0700	South Africa, Channel Africa 7240af				0700 0800			
0600 0700	Swaziland, TWR 4775af	6120af	9500af		0700 0800			
0600 0700	UK, BBC World Service 9410va 11765as	6190af	7160af		0700 0800			
	11940af	12095as	12095as		0700 0800			
	151310as	15360as	15400af	15565as	0700 0800			
	15575me	17640af	17790as	21660as	0700 0800			
0600 0700 as	UK, BBC World Service	17885af			0700 0800			
0600 0700	USA, AFRTS 4319usb	5446usb	5765usb		0700 0800			
	7590usb	7812usb	12579usb		0700 0800			
	12133usb	12579usb	13855usb		0700 0800			
0600 0700	USA, KAIJ Dallas TX 5755na	7505na			0700 0800			
0600 0700	USA, KTBN Salt Lake City UT 9510as	9510as			0700 0800			
0600 0700	USA, KWHR Naalehu HI 6080af	6080af	6180af		0700 0800			
0600 0700	USA, Voice of America 13645af				0700 0800			
0600 0700	USA, WBCQ Kennebunk ME 5105na	7415na			0700 0800			
0600 0700	USA, WBOH Newport NC 5920am				0700 0800			
0600 0700	USA, WEWN Birmingham AL 5745va	5745va	7425va		0700 0800			
	7570va 11615va				0700 0800			

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700 0705	New Zealand, Radio NZ Intl	11820pa						
0700 0727	Czech Rep, Radio Prague Intl	9880eu	11600eu					
0700 0730	Slovakia, Slovak Radio	9440va	15460pa					
0700 0730	UK, BBC World Service	11760me	15575me					
0700 0800 mtwhf	Albania, TWR 11865eu							
0700 0800	Anguilla, Caribbean Beacon	6090am						
0700 0800	Australia, ABC NT Alice Springs	2310irr	4835do					
0700 0800	Australia, ABC NT Katherine	5025do						
0700 0800	Australia, ABC NT Tennant Creek	4910do						
0700 0800	Australia, HCJB 11750au							
0700 0800	Australia, Radio 9660as	12080as	13630as					
0700 0800	Australia, Radio 15160pa	15240va	15415as	15515pa				
0700 0800	Australia, Voice Intl 15335as							
0700 0800	Canada, CFRX Toronto ON	6070do						
0700 0800	Canada, CFVP Calgary AB	6030do						
0700 0800	Canada, CKZN St John's NF	6160do						
0700 0800	Canada, CKZU Vancouver BC	6160do						
0700 0800	China, China Radio Intl 15350as	15465as	17540as					
0700 0800	Costa Rica, University Network 7375va 9725va	5030va	6150va					
0700 0800	11870va							
0700 0800	Eat Guinea, Radio Africa 15190af							
0700 0800	France, Radio France Intl 15605af							
0700 0800	Germany, Bible Voice Broadcasting 5945eu							
0700 0800	Germany, Deutsche Welle 6140eu							
0700 0800	Germany, Deutsche Welle 21675eu							
0700 0800	Ghana, Ghana BC Corp 3366do							
0700 0800	Guyana, Voice of 3291do	5950do						
0700 0800	Italy, IRRS 13840va							
0700 0800	Liberia, ELWA 4760do	4760do						
0700 0800	Malaysia, Radio 7295as	7295as						
0700 0800	Malaysia, Voice of 6175as	6175as						
0700 0800	Monaco, TWR 9870eu							
0700 0800	Myanmar, Radio 9730do							
0700 0800	Namibia, Namibian BC Corp 6060do	6175do						
0700 0800	Namibia, Namibian BC Corp 6060do	6175do						
0700 0800	Nigeria, Radio/Ibadan 6050do							
0700 0800	Nigeria, Radio/Kaduna 4770do							
0700 0800	Nigeria, Radio/Lagos 3326do							
0700 0800	Russia, Voice of 17495pa							
0700 0800	Russia, Voice of 15780eu							
0700 0800	Sierra Leone, Radio UNAMSIL 6137do							
0700 0800	Sierra Leone, SLBS 3316do							
0700 0800	Singapore, Mediacorp Radio 5020do							
0700 0800	South Africa, Channel Africa 7240af							
0700 0800	Swaziland, TWR 4775af							
0700 0800	Taiwan, Radio Taiwan Intl 5950na							
0700 0800	UK, BBC World Service 6005do							
0700 0800	11940af	11765af	11955as					
0700 0800	15310as	15360as	15400af	15565as				
0700 0800	17760as	17790as	17830af	17830as				
0700 0800	USA, AFRTS 4319usb	4319usb	4715af	5105na				
0700 0800	7590usb	7812usb	12579usb	13362usb				
0700 0800	12133usb	12579usb	13855usb	13855usb				
0700 0800	USA, KAIJ Dallas TX 5755na	7505na			0700 0800			
0700 0800	USA, KTBN Salt Lake City UT 9510as	9510as			0700 0800			
0700 0800	USA, KWHR Naalehu HI 6080af	6080af			0700 0800			
0700 0800	USA, Voice of America 13645af	13645af			0700 0800			
0700 0800	USA, WBCQ Kennebunk ME 5105na							

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0700	0800	USA, WJIE Louisville KY	13595am		0800	0900	USA, WRMI Miami FL 6870am	9955am
0700	0800	USA, WMLK Bethel PA	9265eu	9955eu	0800	0900	USA, WTJC Newport NC	9370na
0700	0800	USA, WRMI Miami FL 6870am	9955am		0800	0900	USA, WWCR Nashville TN	3210na
0700	0800	USA, WTJC Newport NC	9370na				5935na	5935na
0700	0800	USA, WWCR Nashville TN	3210na	5070na	0800	0900	USA, WFYR Okeechobee FL	5950af
		5935nd5935na					6855af	5985af
0700	0800	USA, WFYR Okeechobee FL	5985va	6855va	0800	0900	Vanuatu, Radio	4960do
		7355va 9505va	9715va		0815	0900	Guam, TWR/KTWR	11840as
	vl	Vanuatu, Radio	4960do		0830	0900	Australia, ABC NT Katherine	2485do
0706	0800	New Zealand, Radio NZ Intl	9885pa		0830	0900	Australia, ABC NT Tennant Creek	2325do
0715	0750	a	Albania, TWR	11865eu	0830	0900	Australia, Radio	5995as
0715	0750	a	Monaco, TWR	9870eu			9710as 12080pa	9580as
0730	0800	Georgia, Radio Georgia	11805eu				13630pa	9590as
0730	0800	as	Guam, TWR/KTWR	15255as			15240pa	15415pa
0730	0800	as	UK, BBC World Service	15575me	17885af		17750pa	
0740	0800	mtwhf	Guam, TWR/KTWR	15225as				

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0820	mtwhfs	Albania, TWR	11865eu	0900	0930	as	Australia, Radio	9580as	9590as	15240as
0800	0820	s	Monaco, TWR	9870eu	0900	0930		Australia, Radio	15415va		
0800	0830		Australia, ABC NT Katherine	5025do	0900	1000		Guam, TWR/KTWR	11840as		
0800	0830		Australia, ABC NT Tennant Creek	4910do	0900	1000		Anguilla, Caribbean Beacon	6090am		
0800	0830		Australia, Radio	5995as	0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr	
0800	0830		9710as 12080pa	13630pa	0900	1000		Australia, ABC NT Katherine	2485do		
0800	0830	as	Australia, Radio	15415va	0900	1000		Australia, ABC NT Tennant Creek	2325do		
0800	0830		Liberia, ELWA	4760do	0900	1000		Australia, HCJB	11750au		
0800	0830		Malaysia, Voice of	6175as	0900	1000		Australia, Voice Intl	11955as		
0800	0830		Myanmar, Radio	9730do	0900	1000		Canada, CFRX Toronto ON	6070do		
0800	0830		Swaziland, TWR	4775af	0900	1000		Canada, CFVP Calgary AB	6030do		
0800	0845	as	Germany, Bible Voice Broadcasting	5945eu	0900	1000		Canada, CKZN St John's NF	6160do		
0800	0857		China, China Radio Intl	13710al	0900	1000		Canada, CKZU Vancouver BC	6160do		
			15465as	17490eu	0900	1000		China, China Radio Intl	15210pa	17490eu	
				17540as							
0800	0900		Anguilla, Caribbean Beacon	6090am	0900	1000		Costa Rica, University Network	5030va	6150va	
0800	0900		Australia, ABC NT Alice Springs	2310irr	0900	1000		7375va 9725va	11870va	13750va	
0800	0900		Australia, HCJB	11750au	0900	1000		Eqt Guinea, Radio Africa	15190af		
0800	0900		Australia, Voice Intl	15335as	0900	1000		Germany, Deutsche Welle	6140eu		
0800	0900		Canada, CFRX Toronto ON	6070do	0900	1000	DRM	Germany, Deutsche Welle	21675eu		
0800	0900		Canada, CFVP Calgary AB	6030do	0900	1000		Guyana, Voice of	3291do		
0800	0900		Canada, CKZN St John's NF	6160do	0900	1000	vl/as	Italy, IRRS 13840va	15725al		
0800	0900		Canada, CKZU Vancouver BC	6160do	0900	1000		Malaysia, Radio	7295as		
0800	0900		Costa Rica, University Network	5030va	0900	1000		Malaysia, Voice of	15295as		
			7375va 9725va	11870va	0900	1000		Namibia, Namibian BC Corp	3270do	3290do	
					0900	1000	vl	6060do	6175do		
0800	0900		Eqt Guinea, Radio Africa	15190af	0900	1000		New Zealand, Radio NZ Intl	9885pa		
0800	0900		Germany, Deutsche Welle	6140eu	0900	1000		Nigeria, Radio/Ibadan	6050do		
0800	0900	DRM	Germany, Deutsche Welle	21675eu	0900	1000		Nigeria, Radio/Kaduna	4770do	6090do	
0800	0900	vl	Ghana, Ghana BC Corp	3366do	0900	1000		Nigeria, Radio/Lagos 3326do	4990do		
0800	0900	mtwhf	Guam, TWR/KTWR	11840as	0900	1000		Pakistan, Radio	1510eu	17835eu	
0800	0900		Guyana, Voice of	3291do	0900	1000	vl	Papua New Guinea, Catholic Radio	4960do		
0800	0900		Indonesia, Voice of	9525as	0900	1000		Papua New Guinea, NBC	4890do		
0800	0900		Italy, IRRS 13840va	15725al	0900	1000		Rwanda, Radio	6055do		
0800	0900		Malaysia, Radio	7295as	0900	1000	vl	Sierra Leone, Radio UNAMSIL	6137do		
0800	0900		Malaysia, Voice of	15295as	0900	1000		Sierra Leone, SLBS	3316do		
0800	0900		New Zealand, Radio NZ Intl	9885pa	0900	1000	irreg/ vl	Singapore, Mediacorp Radio	6150do		
0800	0900		Nigeria, Radio/Ibadan	6050do	0900	1000		Solomon Islands, SIBC	5020do	9545do	
0800	0900		Nigeria, Radio/Kaduna	4770do	0900	1000	vl	UK, BBC World Service	6190af	6195va	
0800	0900		Nigeria, Radio/Lagos 3326do	4990do	0900	1000		9605as 9740as	11760me	15940af	15310as
0800	0900	vl	Pakistan, Radio	1510eu	0900	1000		15360as	15400af	15485af	15575me
0800	0900		Papua New Guinea, Catholic Radio	4960do	0900	1000		17640eu	17760as	17790as	17830af
0800	0900		Papua New Guinea, NBC	4890do	0900	1000		17885af	21470af	21660as	
0800	0900		Russia, Voice of	17495pa	0900	1000		USA, AFRTS	4319usb	5446usb	5765usb
0800	0900	DRM	Russia, Voice of	17495pa	0900	1000		7590usb	7812usb	12133usb	12579usb
0800	0900		Russia, Voice of	15780eu	0900	1000		12133usb	12579usb	13362usb	13855usb
0800	0900		Sierra Leone, Radio UNAMSIL	6137do	0900	1000		USA, KAU Dallas TX	5755na		
0800	0900	irreg/ vl	Sierra Leone, SLBS	3316do	0900	1000		USA, KAUJ Dallas TX	5755na		
0800	0900		Singapore, Mediacorp Radio	6150do	0900	1000		USA, KTBW Salt Lake City UT	7505na		
0800	0900	vl	Solomon Islands, SIBC	5020do	0900	1000		USA, KWHR Naalehu HI	9510as	9930as	
0800	0900	s	South Africa, African Radio League	7205af	0900	1000		USA, Voice of America	9705va	15205va	
0800	0900		South Korea, Radio Korea Intl	9570as	0900	1000		17745va			
0800	0900		Taiwan, Radio Taiwan Intl	9610pa	0900	1000		USA, WBCQ Kennebunk ME	5105na	7415na	
0800	0900		UK, BBC World Service	6190af	0900	1000		USA, WBOH Newport NC	5920am		
0800	0900		11940af	11955as	0900	1000		USA, WEWN Birmingham AL	5745na	7425na	
0800	0900		15310as	15360as	0900	1000		11875na			
0800	0900		15400af	15485af	0900	1000		USA, WHRI Noblesville IN	7520am	9495am	
0800	0900		15575me	17640eu	0900	1000		USA, WJIE Louisville KY	13595am		
0800	0900		17760as	17790as	0900	1000		USA, WRMI Miami FL	6870am		
0800	0900		17830af	17885af	0900	1000		USA, WTJC Newport NC	9955am		
0800	0900		21470af	21660as	0900	1000		USA, WTCR Nashville TN	9370na		
0800	0900		5446usb	5765usb	0900	1000		5070na	5765na		
0800	0900		7812usb	12133usb	0900	1000		USA, WYFR Okeechobee FL	5985af	6855af	
0800	0900		12133usb	12579usb	0900	1000		9755af			
0800	0900		13362usb	13855usb	0900	1000		Vanuatu, Radio	4960do		
0800	0900		5935na 9985na		0900	1000		Greece, Voice of	9420eu		
0800	0900		USA, KANL Anchor Point AK	11870as	0900	1000		15650eu	21530eu		
0800	0900		USA, KTBN Salt Lake City UT	7505na	0900	1000		Vanuatu, Radio	4960do		
0800	0900		USA, KWHR Naalehu HI	9510as	0900	1000	vl	Greece, Voice of	9420eu		
0800	0900		USA, Voice of America	6080af	0900	1000	vl/s	15650eu	21530eu		
0800	0900		13645af		0900	1000		Vanuatu, Radio	4960do		
0800	0900		USA, WBCQ Kennebunk ME	5105na	0900	1000		Greece, Voice of	9420eu		
0800	0900		USA, WBOH Newport NC	5920am	0900	1000		15650eu	21530eu		
0800	0900		USA, WEWN Birmingham AL	5745na	0900	1000		Vanuatu, Radio	4960do		
0800	0900		11875na		0900	1000		Greece, Voice of	9420eu		
0800	0900		USA, WHRI Noblesville IN	7315am	0900	1000	s	15650eu	21530eu		
0800	0900		USA, WJIE Louisville KY	13595am	0900	1000		Vanuatu, Radio	4960do		
0800	0900		USA, WMLK Bethel PA	9265eu	0900	1000		Greece, Voice of	9420eu		
0800	0900			9955eu	0900	1000		15650eu	21530eu		

Shortwave Guide

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1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000 1030	Australia, Voice Intl	11955as	13685as	1100 1200	Australia, HCJB	15425as
1000 1030	Guam, AWR/KSDA	11930as		1100 1200	Australia, Voice Intl	13635as
1000 1030	Mongolia, Voice of	12085as		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1057	China, China Radio Intl	15210pa	17490pa	1100 1200	Canada, CFVP Calgary AB	6030do
	17690pa			1100 1200	Canada, CKZN St John's NF	6160do
1000 1059	New Zealand, Radio NZ Intl	9885pa		1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	Anguilla, Caribbean Beacon	11775am		1100 1200	Costa Rica, University Network	5030va
1000 1100	Australia, ABC NT Alice Springs	2310do	4835irr	1100 1200	Costa Rica, University Network	5030va
1000 1100	Australia, ABC NT Katherine	2485do		1100 1200	Ecuador, HCJB	13685as
1000 1100	Australia, ABC NT Tennant Creek	2325do		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	Australia, HCJB	15425as		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	Australia, Radio	9580as	15240as	1100 1200	Canada, CKZN St John's NF	6160do
	15415pa			1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	Canada, CFRX Toronto ON	6070do		1100 1200	Costa Rica, University Network	5030va
1000 1100	Canada, CFVP Calgary AB	6030do		1100 1200	Ecuador, HCJB	13685as
1000 1100	Canada, CKZN St John's NF	6160do		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	Canada, CKZU Vancouver BC	6160do		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	Costa Rica, University Network	5030va	6150va	1100 1200	Canada, CKZN St John's NF	6160do
	7375va 9725va	11870va		1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	Guyana, Voice of	3291do		1100 1200	Costa Rica, University Network	5030va
1000 1100	India, All India Radio	13695as	15410as	1100 1200	Ecuador, HCJB	13685as
	17800as	17895as		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	Italy, IRRS 13840va	15725al		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	Japan, Radio	6120na	9695as	1100 1200	Canada, CKZN St John's NF	6160do
	17585eu	17720va	21755pa	1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	Malaysia, Radio	7295as		1100 1200	Costa Rica, University Network	5030va
1000 1100	Malaysia, Voice of	15295as		1100 1200	Ecuador, HCJB	13685as
1000 1100	Netherlands, Radio	9790va	12065va	1100 1200	Canada, CFRX Toronto ON	6070do
	13820va			1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	Nigeria, Voice of	15120af		1100 1200	Canada, CKZN St John's NF	6160do
1000 1100	North Korea, Voice of	6285as 9335ca	3560as	1100 1200	Canada, CKZU Vancouver BC	6160do
	9850ca			1100 1200	Costa Rica, University Network	5030va
1000 1100	Papua New Guinea, Catholic Radio		4960do	1100 1200	Ecuador, HCJB	13685as
1000 1100	Papua New Guinea, NBC	4890do		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	Singapore, Mediacorp Radio	6150do		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	Solomon Islands, SIBC	5020do	9545do	1100 1200	Canada, CKZN St John's NF	6160do
1000 1100	South Africa, Channel Africa	11825af		1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	UK, BBC World Service	6190af	6195va	1100 1200	Costa Rica, University Network	5030va
	9605as 11760me	11940af	15310as	1100 1200	Ecuador, HCJB	13685as
1000 1100	15485af	15575me	17640eu	1100 1200	Canada, CFRX Toronto ON	6070do
	17760as	17790as	17885af	1100 1200	Canada, CFVP Calgary AB	6030do
	21660as		21470af	1100 1200	Canada, CKZN St John's NF	6160do
1000 1100	UK, BBC World Service		15400af	1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	USA, AFRTS	4319usb	17830af	1100 1200	Costa Rica, University Network	5030va
	7590usb	8712usb	5765usb	1100 1200	Ecuador, HCJB	13685as
	12133usb	12579usb	12579usb	1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	USA, KAIJ Dallas TX	5755na		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	USA, KNLS Anchor Point AK	9795as		1100 1200	Canada, CKZN St John's NF	6160do
1000 1100	USA, KTBN Salt Lake City UT	7505na		1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	USA, KWHR Naalehu HI	9930as		1100 1200	Costa Rica, University Network	5030va
1000 1100	USA, Voice of America	9705va	15205va	1100 1200	Ecuador, HCJB	13685as
	17745va			1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	USA, WBCQ Kennebunk ME	5105na		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	USA, WBOH Newport NC	5920am		1100 1200	Canada, CKZN St John's NF	6160do
1000 1100	USA, WEWN Birmingham AL	5850na	7425na	1100 1200	Canada, CKZU Vancouver BC	6160do
	11875na			1100 1200	Costa Rica, University Network	5030va
1000 1100	USA, WHRI Noblesville IN	7520am	9495am	1100 1200	Ecuador, HCJB	13685as
1000 1100	USA, WRMI Miami FL 6870am	9955am		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	USA, WTJC Newport NC	9370na		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	USA, WWCR Nashville TN	5070na	5765na	1100 1200	Canada, CKZN St John's NF	6160do
	5935na 15825na			1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	USA, WYFR Okeechobee FL	5950na	5985na	1100 1200	Costa Rica, University Network	5030va
	6855na 9755na			1100 1200	Ecuador, HCJB	13685as
1000 1045	Ethiopia, Radio	5990af	7110af	1100 1200	Canada, CFRX Toronto ON	6070do
1030 1057	Czech Rep, Radio Prague Intl	9880eu	11615eu	1100 1200	Canada, CFVP Calgary AB	6030do
1030 1058	Vietnam, Voice of	7285as		1100 1200	Canada, CKZN St John's NF	6160do
1030 1100	Iran, Voice of the Islamic Rep	15400as	15485af	1100 1200	Canada, CKZU Vancouver BC	6160do
1030 1100	Vatican City, Vatican Radio	15660as	17660as	1100 1200	Costa Rica, University Network	5030va
	5885eu			1100 1200	Ecuador, HCJB	13685as
	21470af	17830af	17885af	1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	USA, WBCQ Kennebunk ME	5105na		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	USA, WBOH Newport NC	5920am		1100 1200	Canada, CKZN St John's NF	6160do
1000 1100	USA, WEWN Birmingham AL	5850na	7425na	1100 1200	Canada, CKZU Vancouver BC	6160do
	11875na			1100 1200	Costa Rica, University Network	5030va
1000 1100	USA, WHRI Noblesville IN	7520am	9495am	1100 1200	Ecuador, HCJB	13685as
1000 1100	USA, WRMI Miami FL 6870am	9955am		1100 1200	Canada, CFRX Toronto ON	6070do
1000 1100	USA, WTJC Newport NC	9370na		1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100	USA, WWCR Nashville TN	5070na	5765na	1100 1200	Canada, CKZN St John's NF	6160do
	5935na 15825na			1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100	USA, WYFR Okeechobee FL	5950na	5985na	1100 1200	Costa Rica, University Network	5030va
	6855na 9755na			1100 1200	Ecuador, HCJB	13685as
1030 1045	mtwhf			1100 1200	Canada, CFRX Toronto ON	6070do
1030 1057				1100 1200	Canada, CFVP Calgary AB	6030do
1030 1058				1100 1200	Canada, CKZN St John's NF	6160do
1030 1100				1100 1200	Canada, CKZU Vancouver BC	6160do
1030 1100				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB	13685as
				1100 1200	Canada, CFRX Toronto ON	6070do
				1100 1200	Canada, CFVP Calgary AB	6030do
				1100 1200	Canada, CKZN St John's NF	6160do
				1100 1200	Canada, CKZU Vancouver BC	6160do
				1100 1200	Costa Rica, University Network	5030va
				1100 1200	Ecuador, HCJB</td	

Shortwave Guide

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		1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT			
1200 1300		Malaysia, Radio 7295as			
1200 1300		Nigeria, Voice of 15120af			
1200 1300		Papua New Guinea, Catholic Radio	4960do		
1200 1300		Papua New Guinea, NBC	4890do		
1200 1300		Singapore, Radio Singapore Intl	6080as	6150as	
1200 1300		South Korea, Radio Korea Intl	9650va		
1200 1300		Taiwan, Radio Taiwan Intl	7130as		
1200 1300		UK, BBC World Service	6190af	9605am	
		11760me	11865am	11940af	15190am
		15485af	15565eu	15575me	17640eu
		17640me	17830me	17885af	21470af
1200 1300		USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1200 1300		USA, KAJI Dallas TX	5755na		
1200 1300		USA, KNLS Anchor Point AK	9780as		
1200 1300		USA, KTBN Salt Lake City UT	7505na		
1200 1300		USA, KWHR Naalehu HI	11555as		
1200 1300		USA, Voice of America	9760va	15240vqa	
1200 1300		USA, WBCQ Kennebunk ME	17495na		
1200 1300		USA, WBOH Newport NC	5920am		
1200 1300		USA, WEWN Birmingham AL	5850na	7425na	
1200 1300 as		USA, WHRA Greenbush ME	15310na		
1200 1300 as		USA, WHRI Noblesville IN	9840am	11785am	
1200 1300		USA, WINB Red Lion PA	9320am		
1200 1300		USA, WJIE Louisville KY	7490am		
1200 1300		USA, WRMI Miami FL 6870am	9955am		
1200 1300		USA, WTJC Newport NC	9370na		
1200 1300		USA, WWCR Nashville TN	9985na	15825na	
1200 1300		USA, WYFR Okeechobee FL	17505na	17750na	
1205 1220 m		Austria, Radio Austria Intl	6155va	13730va	
1215 1230 twhf		Austria, Radio Austria Intl	17715va		
1215 1300		Egypt, Radio Cairo	17835as		
1230 1245 h		Germany, Bible Voice Broadcasting	12065as		
1230 1245 mtwhf		Guam, TWR/KTWR	11750as		
1230 1258		Vietnam, Voice of	9840as	12020as	
1230 1300		Australia, HCJB	15405as		
1230 1300		Bangladesh, Bangla Betar	7185as		
1230 1300 s		Germany, Bible Voice Broadcasting	5890as		
1230 1300		Sri Lanka, SLBC	6005as	11930as	15745as
1230 1300		Sweden, Radio	13580va	15240na	15735va
1230 1300		Thailand, Radio	9600va	9810va	
1230 1300		Turkey, Voice of	15225eu	15535va	
1230 1300 a		UK, Wales Radio Intl	17745pa		
1235 1300 as		Austria, Radio Austria Intl	17715va		
1245 1300 twhf		Austria, Radio Austria Intl	6155eu	13730eu	
		17715va			
1300 1400		Romania, Radio Romania Intl	11830eu	15105eu	
1300 1400		Singapore, Radio Singapore Intl	6080as	6150as	
1300 1400		South Korea, Radio Korea Intl	9570as	9770as	
1300 1400		Sri Lanka, SLBC	6005as	11930as	15745as
1300 1400		UK, BBC World Service	9740as	11760me	11940af
		9740as	11760me	11940af	15190am
		15420af	15485af	15565va	15575me
		17640va	17760as	17790as	17830af
1300 1400		17885af	21470af		
1300 1400		USA, AFRTS	4319usb	5446usb	5765usb
		7590usb	7812usb	12133usb	12579usb
		12133usb	12579usb	13362usb	13855usb
1300 1400		USA, KAJI Dallas TX	5755na		
1300 1400		USA, KTBN Salt Lake City UT	7505na		
1300 1400		USA, KWHR Naalehu HI	11555as		
1300 1400		USA, Voice of America	9645va	9760va	
1300 1400		USA, WBCQ Kennebunk ME	9330na	17495na	
1300 1400		USA, WBOH Newport NC	5920am		
1300 1400		USA, WEWN Birmingham AL	7425na	9955na	
		15745na			
1300 1400		USA, WHRA Greenbush ME	15310na		
1300 1400		USA, WHRI Noblesville IN	15285am		
1300 1400		USA, WINB Red Lion PA	13570am		
1300 1400		USA, WJIE Louisville KY	7490am		
1300 1400		USA, WRMI Miami FL 6870am	15725am		
1300 1400		USA, WTJC Newport NC	9370na		
1300 1400		USA, WWCR Nashville TN	7465na	13845na	
1300 1400		USA, WWRB Manchester TN	9320na	12170na	
1300 1400		USA, WYFR Okeechobee FL	11830va	11865va	
		11910va	17750va		
1330 1400 s		Australia, HCJB	15405as		
1330 1400		Guam, AWR/KSDA	11980as		
1330 1400		Guam, AWR/KSDA	15275as		
1330 1400		India, All India Radio	9690as		
1330 1400		Laos, National Radio	7145as		
1330 1400		Sweden, Radio	15240na	15735va	
1330 1400		Uzbekistan, Radio Tashkent	7285as	15295as	
		17775as			
1400 1415 h		Germany, Bible Voice Broadcasting	7485as		
1400 1415		Russia, FEBA	9500as		
1400 1430		Australia, Radio	5995as	6080as	7240as
1400 1430		9590as	9625pa		
1400 1430 mtwhf		Germany, Deutsche Welle	15725na		
1400 1430		Thailand, Radio	9725as		
1400 1445 a		Germany, Pan American BC	15650me		
1400 1457		China, China Radio Int'l	7405nd	9560as	
		9700eu	9795eu	11765eu	
		11765eu	13475as	13485cf	

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

400	1415	h	Germany, Bible Voice Broadcasting	7485as		
400	1415		Russia, FBBA	9500as		
400	1430		Australia, Radio	5995as	6080as	7240as
			9590as 9625pa			
400	1430	mtwhf	Germany, Deutsche Welle	15725na		
400	1430		Thailand, Radio	9725as		
400	1445	a	Germany, Pan American BC	15650me		
400	1457		China, China Radio Intl	7405na	9560as	13685af
			9700eu 9795eu	11765eu	13675as	
			17630af			
400	1459	as	Canada, Radio Canada Intl	9515am	13655am	
			17800am			
400	1500		Anguilla, Caribbean Beacon	11775am		
400	1500		Australia, Voice Intl	13635as	15205as	
400	1500		Canada, CBC Northern Service	9625do		
400	1500		Canada, CFRX Toronto ON	6070do		
400	1500		Canada, CFVP Calgary AB	6030do		
400	1500		Canada, CKZN St John's NF	6160do		
400	1500		Canada, CKUZ Vancouver BC	6160do		
400	1500	DRM	China, China Radio Intl	9610va		
400	1500		Costa Rica, University Network	9725va	11870va	
			13750va			
400	1500		France, Radio France Intl	9580va	15615va	
400	1500	as	Germany, Bible Voice Broadcasting	7485as		
400	1500		Germany, Deutsche Welle	6140eu		
400	1500		Germany, Overcomer Ministries	6110eu	13810eu	
400	1500	vl	Greece, Voice of	9375eu	9420eu	9775eu
			12105eu	15630eu		
400	1500		India, All India Radio	9690as	11620as	13710as
400	1500	vl/a	Italy, IRRS 15725va			
400	1500		Japan, Radio	7200as	11730as	11840pa
400	1500		Jordan, Radio	11690na		
400	1500		Malaysia, Radio	7295as		
400	1500		Netherlands, Radio	9345as	9890as	11835as
400	1500		New Zealand, Radio NZ Intl	6095pa		
400	1500		Nigeria, Voice of	15120af		
400	1500		Oman, Radio	15140as		
400	1500	DRM	Russia, Voice of	9480eu		
400	1500		Russia, Voice of	6205as	7390as	9745as
			11755as	15605as	17645as	
400	1500		Singapore, Mediacorp Radio	6150do		
400	1500		South Africa, Channel Africa	11825af		
400	1500		Sri Lanka, SLBC	6005as	11930as	15745as
400	1500		Taiwan, Radio Taiwan Intl	15265as		
400	1500		UK, BBC World Service	6190af	6195as	
			7105as 9740as	11760me	11940af	15310as
			15485af	15565va	17640va	17790as

Shortwave Guide

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1400	1500	17830af	21470af	21660af	5765usb	1500	1600	UK, BBC World Service	1556eu	15575me
		USA, AFRTS	4319usb	5446usb	12133usb	1500	1600	UK, Sudan Radio Service	15530va	
		7590usb	7812usb	12133usb	12579usb	1500	1600	USA, AFRTS	4319usb	5765usb
		12133usb	12579usb	13362usb	13855usb			7590usb	7812usb	12133usb
1400	1500	USA, KAIJ Dallas TX	13815na			12133usb	12579usb	12133usb	12579usb	13362usb
1400	1500	USA, KJES Vado NM	11715na			12579usb		12579usb		13855usb
1400	1500	USA, KNLS Anchor Point AK	9795as							
1400	1500	USA, KTBN Salt Lake City UT	7505na							
1400	1500	USA, KWHR Naalehu HI	11555as							
1400	1500	USA, Voice of America	6160va	7125va						
		9760va 15265va								
1400	1500	USA, WBCQ Kennebunk ME	5105na	7415na						
		9330na 17495na								
1400	1500	USA, WBOH Newport NC	5920am							
1400	1500	USA, WEWN Birmingham AL	9955na	11530na						
		15745na								
1400	1500	USA, WHRA Greenbush ME	15310na							
1400	1500	USA, WHRI Noblesville IN	9840am	15285am						
1400	1500	USA, WINB Red Lion PA	13570am							
1400	1500	USA, WJIE Louisville KY	7490am							
1400	1500	USA, WRMF Miami FL	6870am	15725am						
1400	1500	USA, WTJC Newport NC	9370na							
1400	1500	USA, WWCR Nashville TN	9985na	12160na						
		13845na 15825na								
1400	1500	USA, WWRB Manchester TN	9320na	12170na						
1400	1500	USA, WYFR Okeechobee FL	11830va	11910va						
		13695va 17750va								
1415	1430	Nepal, Radio	3230as	5005as	6100as		1505	1520	m	
		7165as					1505	1530	as	
1430	1445	s					1515	1530	twhf	
1430	1500	Germany, Pan American BC		15650as			1515	1600		
1430	1500	Australia, HCJB	15390as				1530	1545	w	
1430	1500	Australia, Radio	5995as	6080as	7240as		1530	1545	s	
		9475as 9590pa	9625pa				1530	1600	mwh	
1430	1500	South Korea, Radio Korea Intl		9770eu			1530	1600	s	
1445	1500	DRM		15650me			1530	1600	f	
		as					1530	1600	mtwhf	

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1515	s	Germany, Pan American BC	15650as						
1500	1515		Russia, FEBA	7320as						
1500	1528	s	Hungary, Radio Budapest	6025eu	9655eu					
1500	1528		Vietnam, Voice of	9550va	9840va	12020va				
			13860va							
1500	1530		Mongolia, Voice of	12015eu						
1500	1530		Sri Lanka, SLBC	6005as	11930as	15745as				
1500	1530		UK, BBC World Service	6190af	6195as	15745as				
			7105as 9740as	11860af	11940af	12095af				
			15310as	15400af	15420af	15485af				
			17790as	17790as	21470af	21490af				
			21660af							

1500	1555		South Africa, Channel Africa	17770af						
1500	1557		China, China Radio Intl	7160eu	7405na					
			9435eu 9525eu	9785as	13675na	17730na				
1500	1557		Netherlands, Radio	9345va	9890va	11835va				
1500	1559	as	Canada, Radio Canada Intl	9515am	13655am					

1500	1600		Anguilla, Caribbean Beacon	11775am						
1500	1600		Australia, HCJB	15390as						
1500	1600		Australia, Radio	5995as	6080as	7240as				
			9475as 9590pa	9625pa						
1500	1600		Australia, Voice Intl	11840as	13635as	15205as				
1500	1600		Canada, CBC Northern Service	9625do						
1500	1600		Canada, CFRX Toronto ON	6070do						
1500	1600		Canada, CFVP Calgary AB	6030do						
1500	1600		Canada, CKZN St John's NF	6160do						
1500	1600		Canada, CKZU Vancouver BC	6160do						
1500	1600		Canada, Radio Canada Intl	11675as	15360as					
			17720as							

1500	1600	DRM	China, China Radio Intl	9610va						
1500	1600		Costa Rica, University Network	9725va	11870va					
			13750va							
1500	1600	a	Germany, Bible Voice Broadcasting	17510me						
1500	1600	m	Germany, Bible Voice Broadcasting	13590as						

1500	1600		Germany, Deutsche Welle	6140eu						
1500	1600		Germany, Overcomer Ministries	6110eu	13810eu					
1500	1600		Greece, Voice of	9375va	9420va	9775va				
			12105va	15630va						
1500	1600		Guam, TWR/KTWR	12105as						
1500	1600		Japan, Radio	6190as	7200as	9505va				
			11730as							

1500	1600		Jordan, Radio	11690na						
1500	1600		Malaysia, Radio	7295as						
1500	1600		New Zealand, Radio NZ Intl	6095pa						
1500	1600		North Korea, Voice of	3560af	4405eu					
			7570eu 9335na	9990me	11545me	11710va				
1500	1600		12015va							

1500	1600		Russia, Voice of	4965me	4975me	7315af				
			7325me	9810eu	11980eu	11985me				
1500	1600		Singapore, Mediaborg Radio	6150do						
1500	1600		South Africa, Channel Africa	11825af						

1500	1600		UK, BBC World Service	1556eu						
1500	1600		UK, Sudan Radio Service	15530va						
1500	1600		USA, AFRTS	4319usb	5446usb					
			7590usb	7812usb	12133usb	12579usb				
1500	1600		USA, KAIJ Dallas TX	13815na						
1500	1600		USA, KJES Vado NM	11715na						
1500	1600		USA, KNLS Anchor Point AK	9795as						
1500	1600		USA, KTBN Salt Lake City UT	7505na						
1500	1600		USA, KWHR Naalehu HI	11555as						
1500	1600		USA, Voice of America	6160va	7125va					
			9850af 15195va	15445va						
1500	1600		USA, WBCQ Kennebunk ME	5105na	7415na					
			9330na 17495na							
1500	1600		USA, WBOH Newport NC	5920am						
1500	1600		USA, WEWN Birmingham AL	9955na	11530na					
			15745na							
1500	1600		USA, WHRA Greenbush ME	15310na						
1500	1600		USA, WHRI Noblesville IN	9840am	15285am					
1500	1600		USA, WINB Red Lion PA	13570am						
1500	1600		USA, WJIE Louisville KY	7490am						
1500	1600		USA, WRMF Miami FL	6870am	15725am					
1500	1600		USA, WTJC Newport NC	9370na						
			9985na							
1500	1600		USA, WHRA Greenbush ME	15310na						
1500	1600		USA, WHRI Noblesville IN	9840am	15285am					
1500	1600		USA, WINB Red Lion PA	13570am						
1500	1600		USA, WJIE Louisville KY	7490am						

Shortwave Guide



1600	1700	vl	1759as Greece, Voice of 15630va	7475va 17705va	9420va	12105va	1700 1800 1700 1800 1700 1800 as	New Zealand, Radio NZ Intl Nigeria, Voice of Russia, Voice of	15120va 7390eu 9890eu 11510af	6095pa 9405as	9820eu
1600	1700		Malaysia, Radio	7295as				Russia, Voice of	11985af		
1600	1700		North Korea, Voice of		3560va	9990me		Russia, Voice of	11675eu		
1600	1700		Russia, Voice of	6070va	9405as	11640as		UK, BBC World Service		3915as	5975as
			11985af	12055va	15540va			6195eu 7160as	9510as	12095va	15310as
1600	1700		South Korea, Radio Korea Intl	5975va	9870va		1700 1800 vl/ mtwhf	UK, Sudan Radio Service		11715va	
1600	1700		Taiwan, Radio Taiwan Intl	11815as			1700 1800	UK, Voice Africa	13820af		
1600	1700	DRM f	Taiwan, Radio Taiwan Intl	9770eu			1700 1800	USA, AFRTS	4319usb	5446usb	5765usb
1600	1700		UK, BBC World Service	3915as	5975as			7590usb	7812usb	12133usb	12579usb
			6190af 6195as	7160as	9410eu	9510as		12133usb	12579usb	13362usb	13855usb
1600	1700	vl/ mtwhf	UK, Sudan Radio Service	15530va			1700 1800	USA, KAIJ Dallas TX	13815na		
1600	1700		UK, Voice Africa	13820af			1700 1800	USA, KTBN Salt Lake City UT		15590na	
1600	1700		USA, AFRTS	4319usb	5446usb	5765usb	1700 1800	USA, KWHR Naalehu HI		11555as	
			7590usb	7812usb	12133usb	12579usb	1700 1800	USA, Voice of America	6160va	7125va	
			12133usb	12579usb	13362usb	13855usb	1700 1800	9345va 9850af	15410af	15580df	
1600	1700		USA, KAIJ Dallas TX	13815na			1700 1800	USA, WBCQ Kennebunk ME	5105na	7415na	
1600	1700		USA, KJES Vado NM	11715na			1700 1800	9330na 17495na			
1600	1700		USA, KTBN Salt Lake City UT	15590na			1700 1800	USA, WBOH Newport NC	5920am		
1600	1700		USA, KWHR Naalehu HI	11555as			1700 1800	USA, WEWN Birmingham AL	5810va	11530va	
1600	1700		USA, Voice of America	4930af	6160va		1700 1800 as	15745va			
			7125va 9700va	9760va	9825va	9850af	1700 1800	USA, WHRA Greenbush ME	17640na		
			12080va	13600va	15195va	15445va	1700 1800	USA, WHRI Noblesville IN	15285am	15785am	
			15580af	17895va			1700 1800	USA, WINB Red Lion PA	9740am		
1600	1700		USA, WBCQ Kennebunk ME	5105na	7415na		1700 1800	USA, WJIE Louisville KY	7490am		
			9330na 17495na				1700 1800	USA, WMLK Bethel PA	9265eu	15265eu	
1600	1700		USA, WBOH Newport NC	5920am			1700 1800	USA, WRMI Miami FL 9955am	15725am		
1600	1700		USA, WEWN Birmingham AL	11530va	13615va		1700 1800	USA, WTJC Newport NC	9370na		
			15745va				1700 1800	USA, WWCR Nashville TN	9985na	12160na	
1600	1700		USA, WHRA Greenbush ME	17640na			1700 1800	13845na 15825na			
1600	1700		USA, WHRI Noblesville IN	12020am	15285am		1700 1800	USA, WWRB Manchester TN	9320na	12170na	
1600	1700	as	USA, WINB Red Lion PA	9740am			1700 1800 mtwhf	USA, WYFR Okeechobee FL	3955va	13695va	
1600	1700	mtwhf	USA, WINB Red Lion PA	13570as			1700 1800	17795va 18980va	21455va	21680va	
1600	1700		USA, WJIE Louisville KY	7490am			1700 1800	Zambia, Radio Christian Voice	4965af		
1600	1700		USA, WMLK Bethel PA	9265eu			1700 1800	USA, WINB Red Lion PA	13570am		
1600	1700		USA, WRMI Miami FL 9955am	15725am			1700 1800	Israel, Kol Israel	9345va	15640va	
1600	1700		USA, WTJC Newport NC	9370na			1700 1800	Libya, Voice of Africa	11860af		
1600	1700		USA, WWCR Nashville TN	9985na	12160na		1700 1800	UK, United Nations Radio	7150af	15495me	
			13845na	15825na			1700 1800	17810af			
1600	1700		USA, WWRB Manchester TN	9320na	12170na		1700 1800	Bulgaria, Radio	9500eu	11500eu	
1600	1700		USA, WYFR Okeechobee FL	6085va	11830va		1700 1800	Guam, AWR/KSDA	9385me		
			11865va	13695va	15520va	17750va	1700 1800	Liberia, ELWA	4760do		
			18980va	21455va	21525va		1700 1800 mtwhf	Philippines, Radio Pilipinas	11720va	15190va	
1600	1700		Zambia, Radio Christian Voice	4965af			1700 1800	17720va			
1615	1700	as	UK, BBC World Service	11860af			1700 1800	Swaziland, TWR	3200af	9500af	
1630	1700		Egypt, Radio Cairo	11880af			1700 1800	Sweden, Radio	6065va		
1630	1700		Guam, AWR/KSDA	11975as			1700 1800	USA, Voice of America	4930af	11975af	
1630	1700		Slovakia, Slovak Radio	5920eu	7345eu		1700 1800	17895af			
1640	1700	t	Germany, Bible Voice Broadcasting	13590me			1700 1800	Vatican City, Vatican Radio	11625af	13765af	
1651	1700		New Zealand, Radio NZ Intl	6095pa			1700 1800	15570af			

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1710	mtwh	Moldova, Radio PMR	5960eu							
1700	1720	f	Moldova, Radio PMR	5960eu							
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af						
1700	1728		Vietnam, Voice of	9725eu							
1700	1730		France, Radio France Intl	15605af	17605af						
1700	1730		Swaziland, TWR	3200af							
1700	1745		UK, BBC World Service	3255af	6005af						
			6190af 9630af	12095af	15105af	15400af					
			15420af	17820af	17830af	21470af					
1700	1755		South Africa, Channel Africa	15325af							
1700	1757		China, China Radio Intl	6100eu	7255eu						
			9570af 11900af								
1700	1759		Poland, Radio Polonia	5965eu	7285eu						
1700	1800		Anguilla, Caribbean Beacon	11775am							
1700	1800		Australia, Radio	5995as	6080as	9475as					
			9580as 9710as								
1700	1800		Australia, Voice Intl	11840as	13635as	15205as					
1700	1800		Canada, CBC Northern Service	9625do							
1700	1800		Canada, CFRX Toronto ON	6070do							
1700	1800		Canada, CFVP Calgary AB	6030do							
1700	1800		Canada, CKZN St John's NF	6160do							
1700	1800		Canada, CKZU Vancouver BC	6160do							
1700	1800	DRM	China, China Radio Intl	12080va							
1700	1800		Costa Rica, University Network	11870va	13750va						
1700	1800		Egypt, Radio Cairo	11880af							
1700	1800		Egypt, Radio Africa	15190af							
1700	1800	s	Germany, Bible Voice Broadcasting	13590me							
1700	1800	vl	Greece, Voice of	7475va	9420va	12105va					
			15630va	17705va							
1700	1800		Japan, Radio	9535va	11970eu	15355af					
1700	1800		Malaysia, Radio	7295as							

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1815	a	Germany, Bible Voice Broadcasting	11965as							
1800	1828		Vietnam, Voice of	7280va							
1800	1829	s	Germany, Universal Life								
1800	1830	w f	Austria, AWR Europe	15280af							
1800	1830		Egypt, Radio Cairo	11880af							
1800	1830	s	Germany, Bible Voice Broadcasting	6015eu							
1800	1830		South Africa, AWR Africa	3215af							
1800	1830		Swaziland, TWR	3200af							
1800	1830		UK, BBC World Service	3255as							
			6190af 9510as	12095va							
			17830af	21470af							
1800	1850		New Zealand, Radio NZ Intl	6095pa							
1800	1857		Netherlands, Radio	6020af							
1800	1859		Canada, Radio Canada Intl	9530af							
			13730af	15255af							
1800	1900		Anguilla, Caribbean Beacon	11775am							
1800	1900	mtwhf	Argentina, RAE	9690eu							
1800	1900		Australia, Radio	6080as							
			9580as 9710as								
1800	1900		Australia, Voice Intl	11685as							
1800	1900		Bangladesh, Bangla Betar	7185as							
1800	1900		Canada, CBC Northern Service	9625do							
1800	1900		Canada, CFRX Toronto ON	6070do							
1800	1900		Canada, CFVP Calgary AB	6030do							

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1800	1900	Canada, CKZN St John's NF	6160do	1900	2000	Canada, CFRX Toronto ON	6070do	
1800	1900	Canada, CKZU Vancouver BC	6160do	1900	2000	Canada, CFVP Calgary AB	6030do	
1800	1900	China, China Radio Intl	6100eu	12080va	1900	2000	Canada, CKZN St John's NF	6160do
1800	1900	China, China Radio Intl	12080va		1900	2000	Canada, CKZU Vancouver BC	6160do
1800	1900	Costa Rica, University Network	11870va	13750va	1900	2000	Canada, Radio Canada Intl	17765am
1800	1900	Eqt Guinea, Radio Africa	15190af		1900	2000	China, China Radio Intl	12080va
1800	1900	Germany, Bible Voice Broadcasting	6015as	9430me	1900	2000	Costa Rica, University Network	11870va
1800	1900	Germany, Bible Voice Broadcasting	9430me		1900	2000	Eqt Guinea, Radio Africa	15190af
1800	1900	India, All India Radio	7410eu	9445af	1900	2000	Germany, Deutsche Welle	13780af
		11620eu	11935af	13605af	1900	2000	Ghana, Ghana BC Corp	3366do
		15155af	17670af	15075af	1900	2000	Italy, IRRS 5775va	4915do
1800	1900	Liberia, ELWA	4760do		1900	2000	Liberia, ELWA	4760do
1800	1900	Malaysia, Radio	7295as		1900	2000	Malaysia, Radio	7295as
1800	1900	Nigeria, Voice of	15120va		1900	2000	Namibia, Namibian BC Corp	3270do
1800	1900	North Korea, Voice of	12015eu	4405eu	1900	2000	6060do	3290do
1800	1900	Philippines, Radio Pilipinas	17720va	15190va	1900	2000	6175do	
1800	1900	Romania, Radio Romania Intl	9635eu	11830eu	1900	2000	Netherlands, Radio	15315na
1800	1900	Russia, Voice of	9480eu	9890eu	1900	2000	17660na	17735na
1800	1900	Taiwan, Radio Taiwan Intl	3965eu		1900	2000	Netherlands, Radio	7120af
1800	1900	UK, BBC World Service	6195eu	9410eu	1900	2000	17810af	
1800	1900	USA, AFRTS	12095me	15310me	1900	2000	Nigeria, Radio/Ibadan	6050do
		7590usb	7812usb	12133usb	1900	2000	Nigeria, Radio/Kaduna	4770do
		12133usb	12579usb	13362usb	1900	2000	3326do	6090do
1800	1900	USA, KAIJ Dallas TX	13815na		1900	2000	Nigeria, Voice of	7255va
1800	1900	USA, KTBN Salt Lake City UT	15590na		1900	2000	North Korea, Voice of	3560va
1800	1900	USA, Voice of America	4930af	9850af	1900	2000	7100eu	9975eu
1800	1900	11975af	15410af	15580af	1900	2000	11535eu	11910eu
1800	1900	USA, WBCQ Kennebunk ME	9330na	17495na	1900	2000	Papua New Guinea, Catholic Radio	4960do
1800	1900	USA, WBOH Newport NC	5920am		1900	2000	Papua New Guinea, NBC	4890do
1800	1900	USA, WEWN Birmingham AL	11530va	13615va	1900	2000	Russia, Voice of	7380eu
		15695va	15745va		1900	2000	9890eu	
1800	1900	USA, WHRA Greenbush ME	17640na		1900	2000	Sierra Leone, Radio UNAMSIL	6137do
1800	1900	USA, WHRI Noblesville IN	15285am	15785am	1900	2000	Sierra Leone, SLBS	3316do
1800	1900	USA, WINB Red Lion PA	9740am		1900	2000	Solomon Islands, SIBC	5020do
1800	1900	USA, WINB Red Lion PA	13570am		1900	2000	South Africa, African Radio League	3215af
1800	1900	USA, WJIE Louisville KY	7490am		1900	2000	South Korea, Radio Korea Intl	5975va
1800	1900	USA, WMLK Bethel PA	9265eu	15265eu	1900	2000	Sri Lanka, SLBC	6010eu
1800	1900	USA, WRMI Miami FL	15725am		1900	2000	Swaziland, TWR	3200af
1800	1900	USA, WTJC Newport NC	9370na		1900	2000	Thailand, Radio	7155eu
1800	1900	USA, WWCR Nashville TN	9975na	12160na	1900	2000	Uganda, Radio	4976do
		13845na	15825na		1900	2000	5026do	7196do
1800	1900	USA, WWRB Manchester TN	9320na	12170na	1900	2000	UK, BBC World Service	3255af
1800	1900	USA, WYFR Okeechobee FL	13695eu	13780eu	1900	2000	6005af	12095af
		13800eu	17525eu	17795eu	1900	2000	6190af	
1800	1900	Yemen, Rep of Yemen Radio	9780me	18980va	1900	2000	15310me	
1800	1900	Zambia, Radio Christian Voice	4965af		1900	2000	15400af	
1815	1830	as	11635af	11715af	1900	2000	17830am	
1830	1900	as	11715af		1900	2000	USA, AFRTS	4319usb
1830	1900	mtwhf	15660af	15660af	1900	2000	5446usb	5765usb
1830	1900	Greece, Voice of	15630va	17705va	1900	2000	7590usb	7812usb
1830	1900	15630va	17705va	9420va	12105va	12133usb	12579usb	
1830	1900	17705va			1900	2000	13362usb	13855usb
1830	1900	Serbia & Montenegro, Intl Radio	6100eu		1900	2000		
1830	1900	Slovakia, Slovak Radio	5920eu	6055eu	1900	2000		
1830	1900	South Africa, AWR Africa	9590af		1900	2000		
1830	1900	Turkey, Voice of	9785eu		1900	2000		
1830	1900	UK, BBC World Service	3255af	3915as	1900	2000		
		6005af	6190af	9410af	1900	2000		
		15400af	15420af	17830af	1900	2000		
1845	1858	mtwhfa	17720va	21470af	1900	2000		
1845	1900	Albania, Radio Tirana	6115eu		1900	2000		
1845	1900	Congo, RTV Congolaise	4765af	5985af	1900	2000		
1851	1900	New Zealand, Radio NZ Intl	9845pa		1900	2000		

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915	Congo, RTV Congolaise	4765af	5985af	1900	2000	Zambia, Radio Christian Voice	4965af
1900	1915	Germany, Bible Voice Broadcasting	9430me		1900	2000	Zimbabwe, ZBC Corp	5975do
1900	1920	Turkey, Voice of	9785eu		1915	1930	5975am	
1900	1925	Israel, Kol Israel	11605va	15615va	1925	1945	15285am	
1900	1928	Hungary, Radio Budapest	3975eu	6025eu	1930	1945	9740am	
1900	1928	Vietnam, Voice of	7280va	9730va	1930	2000	13570am	
1900	1929	Germany, Universal Life	13820me		1930	2000	USA, WJIE Louisville KY	7490am
1900	1930	Germany, Bible Voice Broadcasting	9430af		1930	2000	USA, WMLK Bethel PA	9265eu
1900	1930	Lithuania, Radio Vilnius	9710eu		1930	2000	15725am	
1900	1930	Philippines, Radio Pilipinas	11720va	15190va	1930	2000	USA, WRMI Miami FL	9370na
		17720va			1930	2000	13800am	
1900	1945	India, All India Radio	7410eu	9445af	1930	2000	USA, WTJC Newport NC	9975na
		11620eu	11935af	13605af	1930	2000	13800am	
		15155af	17670af	15075af	1930	2000	18980va	
1900	1950	New Zealand, Radio NZ Intl	9845pa		1930	2000	18980va	
1900	1957	China, China Radio Intl	7295af	9440af	1930	2000	18980va	
		9585af	12080af		1930	2000	18980va	
1900	2000	Anguilla, Caribbean Beacon	11775am		1935	1955	18980va	
1900	2000	Australia, Radio	6080as	7240as	1945	2000	18980va	
		9580as	9710as	9500as	1945	2000	18980va	
1900	2000	Australia, Voice Intl	11685as		1945	2000	18980va	
1900	2000	Canada, CBC Northern Service	9625do		1945	2000	18980va	

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2010	Vatican City, Vatican Radio	4005eu	5885eu
2000	2027	Czech Rep, Radio Prague Intl	5930eu	11600va
2000	2030	Australia, Voice Intl	11685as	

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2000	2030	Iran, Voice of the Islamic Rep	7205eu	9800eu	2030	2100	Cuba, Radio Havana	9505va	11760va
2000	2030	9925af 11660af	11670af	11860af	2030	2100	Egypt, Radio Cairo	15375af	
2000	2030	Mongolia, Voice of	12015eu		2030	2100	Turkey, Voice of	9730va	
2000	2030	Swaziland, TWR	3200af		2030	2100	UK, Wales Radio Intl	5875eu	
2000	2030	USA, Voice of America	4930af	4940af	2030	2100	USA, Voice of America	11975af	12140as
2000	2030	9850af 11975af	13670af	15410af			15445af	12140as	13670af
2000	2030	DRM		15445af					15410af
2000	2030	Vatican City, Vatican Radio	9800na		2030	2100	Uzbekistan, Radio Tashkent	11905eu	5025eu
2000	2030	Vatican City, Vatican Radio	7365af	9755af	2045	2100	India, All India Radio	7410eu	9445eu
		11625af			2051	2100	9950eu 11620pa	11715pa	9910pa
2000	2050	New Zealand, Radio NZ Intl	11725pa				New Zealand, Radio NZ Intl	15720pa	
2000	2057	China, China Radio Intl	5960al	6100eu					
		7190eu 7295af	9440af	9600eu					
		11640af	12080va	9855eu					
2000	2057	Netherlands, Radio	7120af	9895af					
		17810af		11655af					
2000	2057	Netherlands, Radio	15315na	17735na	2100	2120	Turkey, Voice of	9730as	
2000	2059	as	5850eu	11765eu	2100	2128	Hungary, Radio Budapest	6025eu	9525af
2000	2059	mtwhf	15325eu		2100	2130	Australia, ABC NT Katherine	2485do	
2000	2100	Spain, Radio Exterior Espana	9570af	15290eu	2100	2130	Australia, ABC NT Tennant Creek	2325do	
2000	2100	Anguilla, Caribbean Beacon	11775am		2100	2130	Belarus, Radio	7105eu	7280eu
2000	2100	Australia, ABC NT Alice Springs	2310do	4835irr	2100	2130	Cuba, Radio Havana	9505va	11760va
2000	2100	Australia, ABC NT Katherine	2485do		2100	2130	Serbia & Montenegro, Intl Radio	6100eu	
2000	2100	Australia, ABC NT Tennant Creek	2325do		2100	2130	UK, BBC World Service	11675am	
2000	2100	Australia, Radio	9500pa	11650as	2100	2145	Nigeria, Radio/Ibadan	6050do	
		12080as		11660as	2100	2157	China, China Radio Intl	9600eu	7190eu
2000	2100	Canada, CBC Northern Service	9625do		2100	2157	7285va 9600eu	12080af	13630af
2000	2100	Canada, CFRX Toronto ON	6070do		2100	2157	China, China Radio Intl	12080va	
2000	2100	Canada, CFVP Calgary AB	6030do		2100	2157	Netherlands, Radio	15150eu	
2000	2100	Canada, CKZN St John's NF	6160do		2100	2159	Canada, Radio Canada Intl	17765am	
2000	2100	Canada, CKZU Vancouver BC	6160do		2100	2159	Canada, Radio Canada Intl	9800na	
2000	2100	Canada, Radio Canada Intl	17765am		2100	2159	Spain, Radio Exterior Espana	9570va	9840va
2000	2100	China, China Radio Intl	12080va		2100	2200	Anguilla, Caribbean Beacon	11775am	
2000	2100	Costa Rica, University Network	13750va		2100	2200	Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100	Eqt Guinea, Radio Africa	15190af		2100	2200	Australia, Radio	9660as	11660as
2000	2100	Germany, Deutsche Welle	7130af	11865af	2100	2200	12080pa	13630pa	15515pa
2000	2100	13780af	15205af						
2000	2100	Ghana, Ghana BC Corp	3366do	4915do	2100	2200	Austria, AWR Europe	9715af	
2000	2100	Indonesia, Voice of	9525as	11785pa	2100	2200	Bulgaria, Radio	5800eu	7500eu
2000	2100	Italy, IRRS 5775va		15150al	2100	2200	Canada, CBC Northern Service	9625do	
2000	2100	Liberia, ELWA	4760do		2100	2200	Canada, CFRX Toronto ON	6070do	
2000	2100	Malaysia, Radio	7295as		2100	2200	Canada, CFVP Calgary AB	6030do	
2000	2100	Namibia, Namibian BC Corp	3270do	3290do	2100	2200	Canada, CKZN St John's NF	6160do	
		6060do	6175do		2100	2200	Canada, CKZU Vancouver BC	6160do	
2000	2100	Nigeria, Radio/Ibadan	6050do		2100	2200	Costa Rica, University Network	13750va	
2000	2100	Nigeria, Radio/Kaduna	4770do	6090do	2100	2200	Egypt, Radio Cairo	15375af	
2000	2100	Nigeria, Radio/Lagos 3326do	4990do		2100	2200	Eqt Guinea, Radio Africa	15190af	
2000	2100	Nigeria, Voice of	7255va		2100	2200	Germany, Deutsche Welle	9440af	11865af
2000	2100	Papua New Guinea, Catholic Radio		4960do					
2000	2100	Papua New Guinea, NBC	4890do		2100	2200	Ghana, Ghana BC Corp	3366do	4915do
2000	2100	Russia, Voice of	7310eu	7330eu	2100	2200	Guyana, Voice of	3291do	5950do
2000	2100	Sierra Leone, Radio UNAMSIL	6137do		2100	2200	India, All India Radio	7410eu	9445eu
2000	2100	Solomon Islands, SIBC	5020do	9545do	2100	2200	9950eu 11620pa	11715pa	
2000	2100	South Africa, AWR Africa	7175af		2100	2200	Italy, IRRS 5775va		
2000	2100	South Africa, Channel Africa	3345af		2100	2200	Japan, Radio	6035pa	6180eu
2000	2100	Uganda, Radio	4976do	5026do	2100	2200	11855af	17825na	21670pa
2000	2100	UK, BBC World Service	3255af	6005af	2100	2200	Liberia, ELWA	4760do	
		6195af 9410af	9630af	12095af	2100	2200	Malaysia, Radio	7295as	
		17830af		15400af	2100	2200	Namibia, Namibian BC Corp	6060do	6175do
2000	2100	USA, AFRTS	4319usb	5446usb	2100	2200	New Zealand, Radio NZ Intl	15720pa	
		7590usb	7812usb	12133usb	2100	2200	Nigeria, Radio/Kaduna	4770do	6090do
		12133usb	12579usb	13362usb	2100	2200	Nigeria, Radio/Lagos 3326do	4990do	
2000	2100	USA, KAIJ Dallas TX	13815na		2100	2200	North Korea, Voice of	4405eu	7570eu
2000	2100	USA, KJES Vado NM	15385na		2100	2200	Papua New Guinea, Catholic Radio	4890do	4960do
2000	2100	USA, KTBN Salt Lake City UT	15590na	9670va	2100	2200	Papua New Guinea, NBC	4890do	
2000	2100	USA, Voice of America	13635va		2100	2200	Rwanda, Radio	6055do	
2000	2100	USA, WBCQ Kennebunk ME	5105na	7415na	2100	2200	Sierra Leone, Radio UNAMSIL	6137do	
		9330na 17495na			2100	2200	Sierra Leone, SLBS	3316do	
2000	2100	USA, WBOH Newport NC	5920am		2100	2200	South Africa, Channel Africa	3345af	
2000	2100	USA, WEWN Birmingham AL	11530va	13615va	2100	2200	South Korea, Radio Korea Intl	3955eu	
		15745va	17595va		2100	2200	Syria, Radio Damascus	12085eu	13610eu
2000	2100	USA, WHRA Greenbush ME	15665na		2100	2200	UK, BBC World Service	3255af	3915as
2000	2100	USA, WHRI Noblesville IN	15285am	15785am	2100	2200	5965as 6005af	6110as	6190af
2000	2100	USA, WINB Red Lion PA	9740am		2100	2200	9410af 9605af	15390am	15400af
2000	2100	USA, WINB Red Lion PA	13570am		2100	2200	Ukraine, Radio Ukraine Intl	7420eu	
2000	2100	USA, WJIE Louisville KY	7490am		2100	2200	USA, AFRTS	4319usb	5765usb
2000	2100	USA, WMLK Bethel PA	9265eu	15265eu	2100	2200	7590usb	7812usb	12133usb
2000	2100	USA, WRMI Miami FL	9955am		2100	2200	12133usb	12579usb	13362usb
2000	2100	USA, WTJC Newport NC	9370na		2100	2200	USA, KAIJ Dallas TX	13815na	
2000	2100	USA, WWCR Nashville TN	9975na	12160na	2100	2200	USA, KTBN Salt Lake City UT	15590na	
		13845na	15825na		2100	2200	USA, Voice of America	4930af	11975af
2000	2100	USA, WWRB Manchester TN	9320na	12170na	2100	2200	12140as	15410af	15445af
2000	2100	USA, WYFR Okeechobee FL	3230va	13800va	2100	2200	USA, WBCQ Kennebunk ME	5105na	7415na
		15195va	17725af	17750va	2100	2200	9330na 17495na		
		17845va	18980va	17795va	2100	2200	USA, WBOH Newport NC	5920am	
					2100	2200	USA, WEWN Birmingham AL	11530va	13615va
2000	2100	Zambia, Radio Christian Voice	4965af		2100	2200	15745va	17595va	
2000	2100	Zimbabwe, ZBC Corp5975do			2100	2200	USA, WHRA Greenbush ME	11765na	
2005	2100	Syria, Radio Damascus	12085eu	13610eu	2100	2200	USA, WHRI Noblesville IN	15285am	15785am
2025	2045	Italy, RAI Intl	11875af		2100	2200	USA, WINB Red Lion PA	13570am	
2030	2045	Libya, Voice of Africa	11635af		2100	2200	USA, WJIE Louisville KY	7490am	
2030	2045	Thailand, Radio	9535eu		2100	2200	USA, WMLK Bethel PA	15265eu	
2030	2058	Vietnam, Voice of	7280va	9550va	2100	2200			
		9550va 11630va			2100	2200			

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2100	2200	USA, WRMI Miami FL	9955am	15725am		2200	2300	Zambia, Radio Christian Voice	4965af
2100	2200	USA, WTJC Newport NC	9370na		2205	2230	Italy, RAI Intl	11895as	
2100	2200	USA, WWCR Nashville TN	9975na	12160na	2215	2230	Croatia, Croatian Radio	9925na	
		13845na	15825na		2230	2257	Czech Rep, Radio Prague Intl	7345na	
2100	2200	USA, WWRB Manchester TN	9320na	12170na	2230	2259	Canada, Radio Canada Intl	9415na	
2100	2200	USA, WYFR Okeechobee FL	11565va	13800va			12035as	9525as	
		17725va	17795va	17845va	18980va	2230	2300	Australia, HCJB	15525as
2100	2200	Zambia, Radio Christian Voice	4965af		2230	2300	Guam, AWR/KSDA	11850as	15320as
2100	2200	vl			2230	2300	USA, Voice of America	9570va	13755va
2105	2159	Spain, Radio Exterior Espana	9570va	9840va			15145va		
2115	2130	vl			2245	2300	India, All India Radio	9705as	9950as
2115	2200	Libya, Voice of Africa	11635af				11645as	13605as	11620as
2130	2145	Egypt, Radio Cairo	9990eu						
2130	2157	UK, BBC World Service	11720am						
2130	2158	Czech Rep, Radio Prague Intl	9800af	11600na					
2130	2200	Albania, Radio Tirana	7120eu						
2130	2200	Australia, ABC NT Katherine	5025do						
2130	2200	Australia, ABC NT Tennant Creek	4910do						
2130	2200	Romania, Radio Romania Intl	7165eu	9535eu					
		9645eu 11940na							
2130	2200	Sweden, Radio	6065va	7420va	2300	0000	Anguilla, Caribbean Beacon	6090am	
2130	2200	Uzbekistan, Radio Tashkent	11905eu	5025eu	2300	0000	Australia, ABC NT Alice Springs	2310do	4835irr
					2300	0000	Australia, ABC NT Katherine	5025do	
					2300	0000	Australia, ABC NT Tennant Creek	4910do	
					2300	0000	Australia, HCJB	15525as	
					2300	0000	Palau, Radio P	9700	11700

2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2205	Syria, Radio Damascus	12085eu	13610eu	2300	0000	Canada, CKZN St John's NF	6160do
2200	2230	DRM	Germany, Deutsche Welle	9800as	2300	0000	Canada, CKZU Vancouver BC	6160do
2200	2230		India, All India Radio	7410eu	9945eu	9910pa	Costa Rica, University Network	13750va
			9950eu 11620pa	11715pa			Cuba, Radio Havana	9550na
2200	2230		Papua New Guinea, NBC	9675do			Egypt, Radio Cairo	11885na
2200	2230	mtwhf	Serbia & Montenegro, Intl Radio	7230pa			Germany, Deutsche Welle	5955as
2200	2245		Egypt, Radio Cairo	9990eu			15135as	9890as
2200	2250		Turkey, Voice of	9830va			Ghana, Ghana BC Corp	3366do
2200	2257		China, China Radio Intl	7170eu			Guyana, Voice of	4915do
2200	2257	DRM	Netherlands, Radio	15525na			India, All India Radio	9950as
2200	2300		Anguilla, Caribbean Beacon	6090am			11645as	11620as
2200	2300		Australia, ABC NT Alice Springs	2310do	4835irr		Malaysia, Radio	7295as
2200	2300		Australia, ABC NT Katherine	5025do			Namibia, Namibian BC Corp	3270do
2200	2300		Australia, ABC NT Tennant Creek	4910do			6106do	3290do
2200	2300		Australia, Radio	13630as	15230as		6175do	
			15240pa	15515pa			New Zealand, Radio NZ Intl	15720pa
2200	2300		Canada, CBC Northern Service	9625do			Papua New Guinea, Catholic Radio	9675do
2200	2300		Canada, CFRX Toronto ON	6070do			Papua New Guinea, NBC	4960do
2200	2300		Canada, CFVP Calgary AB	6030do			Romania, Radio Romania Intl	6140eu
2200	2300		Canada, CKZN St John's NF	6160do			9645eu 11940na	7265eu
2200	2300		Canada, CKZU Vancouver BC	6160do			Sierra Leone, Radio UNAMSIL	6137do
2200	2300		Costa Rica, University Network	13750va			Sierra Leone, SLBS	3316do
2200	2300		Eqt Guinea, Radio Africa	15190af			Singapore, Mediacorp Radio	6150do
2200	2300		Germany, Deutsche Welle	7115as	9720as		Solomon Islands, SIBC	5020do
2200	2300	vl	Ghana, Ghana BC Corp	3366do	4915do		UK, BBC World Service	9545do
2200	2300		Guyana, Voice of	3291do			USA, AFRTS	5975am
2200	2300		Malaysia, Radio	7295as			7415na	
2200	2300	vl	Namibia, Namibian BC Corp	6060do	3290do		USA, AFRTS	4319usb
			6175do				5446usb	5765usb
2200	2300		New Zealand, Radio NZ Intl	15720pa			7590usb	7812usb
2200	2300		Nigeria, Radio/Ibadan	6050do			12133usb	12579usb
2200	2300		Nigeria, Radio/Kaduna	4770do	6090do		12579usb	13855usb
2200	2300		Nigeria, Radio/Lagos	3326do	4990do		13856usb	
2200	2300		Papua New Guinea, Catholic Radio	4960do			USA, KAJI Dallas TX	13815na
2200	2300		Sierra Leone, Radio UNAMSIL	6137do			USA, KAJI Dallas TX	13815na
2200	2300	irreg/ vl	Sierra Leone, SLBS	3316do			USA, KTBN Salt Lake City UT	15590na
2200	2300	vl	Solomon Islands, SIBC	5020do	9545do		USA, KTBN Salt Lake City UT	12140as
2200	2300		Taiwan, Radio Taiwan Intl	15600eu			USA, Voice of America	5105na
2200	2300		UK, BBC World Service	5965as	5975am		USA, WBCQ Kennebunk ME	7415na
			6195as 7105as	9605va	9740as		9330na	
			15400af				USA, WBOH Newport NC	5920am
2200	2300		USA, AFRTS	4319usb	5446usb		USA, WEWN Birmingham AL	7425va
			7590usb	7812usb	5765usb		11530va	9975va
			12133usb	12579usb	12579usb		15695va	
2200	2300		USA, KAJI Dallas TX	13815na			USA, WHRA Greenbush ME	7520na
2200	2300		USA, KTBN Salt Lake City UT	15590na			USA, WINB Red Lion PA	9320am
2200	2300		USA, Voice of America	7215va	12140as		USA, WJIE Louisville KY	13595am
			15185va	15290va	15305va		USA, WTJC Newport NC	9370na
			17820va		17740va		USA, WWCR Nashville TN	5070na
2200	2300		USA, WBCQ Kennebunk ME	5105na	7415na		9985na 13845na	7465na
			9330na 17495na				USA, WWVRB Manchester TN	3185na
2200	2300		USA, WBOH Newport NC	5920am			5085na 5745na	5050na
2200	2300		USA, WEWN Birmingham AL	9975va	11530va		6890na	
			15695va	15745va			USA, WYFR Okeechobee FL	11740va
2200	2300	s	USA, WHRA Greenbush ME	11765na			17750va	15255va
2200	2300	mtwhfa	USA, WHRI Noblesville IN	9840am			Zambia, Radio Christian Voice	4965af
2200	2300		USA, WHRI Noblesville IN	15120am	15285am		Nigeria, Radio/Kaduna	4770do
2200	2300		USA, WINB Red Lion PA	13570am			Nigeria, Radio/Lagos	6090do
2200	2300		USA, WJIE Louisville KY	13595am			Australia, Radio	9660as
2200	2300		USA, WRMI Miami FL	15725am			13630pa	13620as
2200	2300		USA, WRMI Miami FL	15725am			15230pa	21740pa
2200	2300		USA, WTJC Newport NC	9370na			6195as 9605as	3915as
2200	2300		USA, WWCR Nashville TN	5070na	7465na		9740as	5965as
			9985na 13845na				11945as	11955as
2200	2300		USA, WWVRB Manchester TN	9320na	12170na		USA, Voice of America	9570va
2200	2300		USA, WYFR Okeechobee FL	11740va	15770va		13755va	
							15145va	
							China, China Radio Intl	5975as
							6145na 7180as	5990na
							11970na	
							Australia, Radio	9660as
							12080as	13620as
							13630pa	15240pa
							15230pa	17750pa
							17795pa	21740pa
							Burma, Dem Voice of Burma	9435eu
							Lithuania, Radio Vilnius	7325na
							UK, BBC World Service	9740as
							11955as	11945as
							15280as	
							USA, Voice of America	7260va
							9840as	13725va
							Vietnam, Voice of	12020va

Most Frequently Asked Question – Answered

One of the most frequently asked questions I receive from *MT Milcom* column readers is, “How can I listen to military aircraft communications, when I don’t live close to a military base?”

While it is true that if you live close to a base you will hear a lot of milair radio traffic, all is not lost if you are not within VHF/UHF range of a military installation. You can still monitor a lot of military comms by monitoring the Federal Aviation Administration’s Air (FAA) Route Traffic Control Center (ARTCC) frequencies. But before we start exploring the world of ARTCCs, let’s briefly review the other air traffic control functions of the FAA to better understand how these facilities fit into the National Air Space system.

Aviation monitoring enthusiasts are familiar with the tower located at the local airport. These towers are manned by tower controllers and are only one part of a complex system of air traffic control (ATC) that mixes and manages all kinds of aircraft. This includes those pilots flying under visual flight rules (VFR), who provide their own separation visually once they are more than five miles from the airport; and those flying under instrument flight rules (IFR) – pilots who are managed and separated from other IFR flights from their departure point to destination by the air traffic control system.

The tower controller, also called a local controller, separates both VFR and IFR airplanes in his (or her) area. The controller is in radio contact with each aircraft and generally relies on visual contact with the aircraft to keep them separated.

Most towers also have a ground controller who provides various services to pilots while they are still on the ground. In addition, at the larger and busier airports, there might be additional local controllers (depending on the number of runways), and a second ground controller, as well as a clearance delivery controller for passing on IFR clearances without cluttering up otherwise busy local or ground control frequencies. Some facilities even have a pre-taxi controller and ramp controllers located in the tower.

For a pilot flying a VFR flight plan, contact with air traffic control often ends when leaving the tower controller’s area and doesn’t resume again until arriving near the destination airport and contacting the tower controller there. However, the hidden and far more expensive and complex part of the National Air Space system involves the other two types of FAA ATC facilities: approach and departure, and enroute air traffic control.

Approach (and departure) control can be accomplished using non-radar procedures, but it is more commonly associated with radar control. The approach and departure facility that is associated with controlling these aircraft via radar is called the Terminal Radar Approach Control (TRACON) facility. It is usually located in a large, dark room found partway down the airport control tower structure from the cab (that is the windowed area at the top of the tower) or at the base of the tower. Some of these approach/departure facilities (like the Potomac TRACON, which controls a large area of airspace in and around Washington, DC, Baltimore, Maryland, and eastern areas of Virginia), are in buildings far removed from any airport property.

The airspace which a TRACON controls is typically from the surface to 18,000 feet above ground level (AGL), and typically encompasses a radius out to 40 miles from the major airport it is serving. Obviously, the larger facilities have concomitantly larger airspace allocations and

responsibilities than smaller airports.

TRACON airspace is divided into arrival airspace, departure airspace (sometimes more than one of each), and may also have separate controllers for auxiliary airports within their airspace.

❖ ARTCCs Control Everything Else

The remainder of the nation’s airspace is controlled by 21 enroute aeronautical facilities known as Air Route Traffic Control Centers (ARTCCs), usually just identified as “center” on VHF/UHF radio frequencies. The smallest of these facilities may only cover 100,000 square miles, while the largest covers the better part of five western U.S. states. The Chicago ARTCC is one of the smallest geographically, yet it is the busiest in terms of aircraft traffic.

Like the TRACONs, ARTCC airspace is divided into several sectors based on geography. In addition, center airspace is usually stratified by altitude; typically from the ground or upper TRACON limit of 18,000 feet to 60,000 feet and above. Flight levels (altitudes) are communicated between pilots and controllers in hundreds of feet (i.e. FL240 for 24,000 feet, etc.).

Normally, altitudes from the surface to 18,000 (FL180) are called low altitude sectors. Flight levels FL240 through FL350 are known as high altitude sectors, and FL350 and above are ultra high altitude sectors.

ARTCCs are capable of direct communications with IFR air traffic within a sector on a pair of VHF/UHF frequencies. Maximum communications and radar coverage is possible at each center through the use of Remote Center Air/Ground (RCAG) sites scattered throughout the United States. A typical site consists of both VHF and UHF transmitters and receivers, and the radar system used to control aircraft in the sector or sectors served by that RCAG. There are over 793 of these RCAG sites located throughout the U.S. Though they may be several hundred miles away from the ARTCC, they are remoted to the various ARTCCs by land lines or microwave links.

Some ARTCCs have special



Courtesy FAA

radio frequencies set aside that are known as "discrete" frequencies. These frequencies are different from the ARTCC's normal sector frequencies. They are used for controlling aircraft flying in special airspace, such as a military operating area (MOA), a designated warning or limited access area, or for IFR aircraft flying into airports not served by a TRACON. ARTCCs do provide approach and departure services into those airports.

Each ARTCC is responsible for the safe and expeditious flow of anything that flies through its airspace. As mentioned above, ARTCCs are separated into between 21 and 65 sectors that have been carved out of the ARTCC's airspace, both horizontally and vertically.

Each of these ARTCC sectors is equipped at the center with one radar scope, one assistant controller position, and is manned by between one to three air traffic controllers, depending on the complexity and traffic volume at an given time in that sector.

Generally five to eight sectors comprise what is called an "area of specialization." Up to nine of these "areas" make up each ARTCC. An ARTCC controller is certified to work all sectors in any one area and, normally, controllers do not work sectors in other areas without extensive retraining.

❖ Time for an ARTCC update

It has been a long time since we have updated our FAA ARTCC frequency list published in *MT*. So, starting with this issue of *Milcom* we will present the first of our newly compiled list of ARTCC frequencies. Please note that we will not carry an ARTCC frequency list in this column if world events warrant covering other material. So please be patient and we will get around to the ARTCC covering your area as soon as space and events allow.

This month we kick off our listings of ARTCCs with Atlanta Center (Table One) that serves the world's second busiest airport – Hartsfield-Jackson International Airport in Atlanta, Georgia. One of the busiest en route air traffic corridors in the world is controlled by the Atlanta ARTCC, and it is responsible for feeding aircraft traffic into Hartsfield-Jackson International. It is known as the Northeast Atlanta Macey Arrival. You can even monitor this sector's VHF frequency of 121.350 MHz on the internet A near realtime feed of their air-to-ground communications and current controller radar picture of aircraft traffic north, northeast and east of Atlanta is available at <http://atcmonitor.com/>

One other thing you should remember is that you won't be able to monitor the ground side of the air-to-ground communications unless you are close to one of the RCAGs listed below. You will, however, be able to hear the aircraft side of the communications at a much further distance. If you are within 200 to 300 miles of one the sites listed below, plug in the RCAG VHF/UHF frequency pair for that site and get ready to monitor some of the most interesting civilian and military aircraft communications on your scanner – communications from the FAA ARTCCs.

Until next time, 73 and good hunting.

Table One: Atlanta ARTCC Frequencies

Note: all frequencies are in MHz and mode is AM.

RCAG Location	VHF/UHF	ATC Service
Albemarle, NC	133.150/251.100	Low Discrete
Anniston, AL	134.950/306.200	Low Discrete [Turkey Haven Mountain]
Athens, GA	120.425/327.150 124.450/254.350	High Low
Atlanta A, GA	127.500/316.050 135.000/317.700 369.900	Low Discrete: Approach/Departure Services Low [Austell] High: Tactical Support Use Frequency (FL450 and above) (Amber 5)
Augusta, GA	128.100/323.000	Low Discrete: Approach/Departure Services
Birmingham, AL	128.725/306.250 134.050/261.500	High
Black Jack Mountain, GA	127.050/370.900	Low Discrete (Marietta)
Chattanooga, TN	124.875/270.600 126.675/363.100 132.050/353.800 133.175/299.200	High High
Columbus, MS	120.450/357.600 125.575/239.350	Low Discrete: Approach/Departure Services
Crossville, TN	125.925/236.700 132.675/279.500 133.600/254.300	High High Ultra High Low Discrete: Approach/Departure Services/AR-633A/B Refueling Anchor
Foothills, GA	124.375/380.350	High [Toccoa]
Gadsden, AL	133.800/353.700	Low Discrete: Approach/Departure Services
Glade Springs, VA	127.850/371.850	Low Discrete: Approach/Departure Services
Greensboro, NC	124.425/343.800 128.800/379.200	High Low
Hampton, GA	121.500/243.000 124.325/380.150 126.475/371.950 127.125/363.250 128.000/343.900 264.200, 279.200	Low/High Ultra High High High
Hickory, NC	125.150/263.000 132.975/307.350 134.550/290.200 369.900	Low Discrete: Approach/Departure Services Ultra High Low Discrete High: Tactical Support Use Frequency (FL450 and above) (Amber 5)
Huntsville, AL	126.825/354.050	Ultra High
Jonesville, SC	119.575/257.900 125.025/291.750	Low Discrete: Approach/Departure Services Ultra High
Macon, GA	119.575/257.900 123.950/273.600 126.425/335.650 134.500/360.750	High Low Discrete: Approach/Departure Services High Low Discrete: Approach/Departure Services (SFC-FL290)
Millen, GA	135.550/343.750	Low Discrete: Approach/Departure Services
Monroeville, AL	118.550/267.900	Low Discrete: Approach/Departure Services/Camden Ridge MOA
Montgomery, AL	120.550/270.250 125.875/308.600 128.025/290.500 134.600/319.100 280.100	Low Discrete: Approach/Departure Services/Pine Hill MOA (Prattville) Ultra High High Ultra High Low/Pine Hill MOA
Mt. Oglethorpe, GA	121.350/377.050 133.100/290.800 134.800/307.900	Low Discrete [Logen Sector: Northeast Atlanta Macey Arrival] Low Low Discrete: Approach/Departure Services
Newport, TN	127.550/269.500 134.075/236.500	Low Discrete Ultra High
Owing, SC	123.725/327.000 125.625/269.100 135.350/319.250	High High Low Discrete: Approach/Departure Services
Pine Level, AL	243.000 307.150 335.600 369.900	Low/High High/Birmingham MOA Low High: Tactical Support Use Frequency (FL450 and above) (Amber 5)
Sugarloaf Mountain, GA	132.625/281.100 120.275/354.150 126.775/301.400 132.900/319.900	Low Discrete: Approach/Departure Services High [Damascus] High
Tri City, TN	132.250/297.400 133.250/339.100 252.900, 352.800	Low Discrete: Approach/Departure Services Low Discrete: Approach/Departure Services/Birmingham MOA Low/Birmingham MOA Low/Birmingham MOA
Uniontown, AL		Additional Atlanta ARTCC frequencies monitored (RCAG unknown): 119.350 125.825 126.625 135.800 MHz

State-by-State Through the South

Our AM DX tour of North America has reached the American South. Dixie is home to some 50,000-watt powerhouses, but some of the region's larger states can be surprisingly difficult to DX. Here goes:

Virginia:

The big signal from Virginia is WRVA-1140, Richmond. At 50,000 watts non-directional, this news/talk station should be easily heard most nights anywhere east of the Rockies. If for some reason WRVA doesn't make the trip to your location, Virginia is also home to an expanded-band station, WHKT-1650 Portsmouth. Unfortunately, this is a Radio Disney outlet that will be difficult to identify.

North Carolina:

The Tarheel State has two 50,000-watt stations. Both are directional at night, but their patterns are not all that tight. WPTF-680 Raleigh and WBT-1110 Charlotte are both news/talk stations. If you're west of the Carolinas, try these stations at sunrise and sunset. There's also an all-sports station on 1660 in the expanded band in Charlotte.

South Carolina:

South Carolina is a lot tougher than its northern neighbor. I've had the most success with sunrise reception of two daytime-only stations, WLFJ-660 Greenville (religious) and WCEO-840 Columbia (news/talk, but a format change is rumored). I also frequently hear news/talk WSCC-730 and black gospel WXTC-1390, both Charleston.

Georgia:

WSB-750 is the Peach State's 50,000-watt non-directional station. Georgia is also home to three expanded-band stations: news/talk WRDW-1630 Augusta; talk WMWR-1670 Dry Branch (Macon); and Air America WWAA-1690 Avondale Estates (Atlanta). Daytime-only stations WHGH-840 Thomasville (urban) and WDGR-1210 Dahlonega (ethnic) are often heard at sunset; Spanish-language WAZX-1550 is frequently reported.

Florida:

For such a populous and important state, Florida is surprisingly difficult to DX. The state has three 50,000-watt stations but all three are directional offshore. One, WAQI-710 Miami, broadcasts in

Spanish. There's a high-powered Cuban station on the same frequency, so you cannot assume Spanish on 710 is Miami. WINZ-940 is Air America and has made the trip to Nashville a few times. News/talk WOKV-690 Jacksonville is a good sunrise/sunset bet. WOKV also tends to stay on day facilities at night when hurricanes threaten Florida's East Coast; when this happens, the station is very easy to DX pretty much anywhere in the East.

Florida is home to four expanded-band stations. WJCC-1700 Miami and WLAA-1680 Winter Garden (Orlando) are Spanish-language stations. WCNZ-1660 Marco Island is business news. WNRP-1620 Gulf Breeze (Pensacola) is reported relaying various Pensacola FM stations, most notably WYCT-98.7 "Cat Country."

Kentucky:

Louisville news/talk WHAS-840 is the big signal from here. WPAD-1560 Paducah (easy listening) is often heard by DXers. A bit more difficult but commonly heard are Lexington news/talk stations WVLK-590 and WLAP-630; and Louisville talkers WGTK-970 and WKJK-1080.

Tennessee:

Music City is home to two 50,000-watt stations. WSM-650 is the home of the famous Grand Ol' Opry, and one of the last clear channel music stations on AM. With their non-directional night signal, WSM should be audible across most of the country. News/talk WLAC-1510 goes directional at night, but with a fairly loose pattern. They, too, are worth looking for throughout most of the country. Three other good targets in the Volunteer State are Memphis religious station WMQM-1600 (50,000 watts daytime only) and Knoxville stations WRJZ-620 (religious) and WNOX-990 (news/talk).

Alabama:

At night, your best bet for Alabama is probably the state's expanded-band station,

Best bets for logging the Southern states:

Virginia:.....	WRVA-1140, WHKT-1650
North Carolina:.....	WPTF-680, WBT-1110
South Carolina:.....	WLFJ-660, WCEO-840, WSCC-730
Georgia:.....	WSB-750, WMWR-1670, WRDW-1630
Florida:.....	WINZ-940, WOKV-690, WNRP-1620
Kentucky:.....	WHAS-840, WPAD-1560, WVLK-590
Tennessee:.....	WSM-650, WLAC-1510, WNOX-990
Alabama:.....	WEUV-1700, WAPI-1070, WJOX-690
Mississippi:.....	WCPC-940, WSAO-1140, WTNI-1640

WEUV-1700 Huntsville (a black gospel station, simulcasting WEUP-1600). Another expanded-band station once operated on 1620 from southern Alabama, but this station has moved to Gulf Breeze, Florida (see above).

Within the traditional AM band, your best bets for Alabama are probably WAPI-1070 (news/talk) and WJOX-690 (sports), both Birmingham. Those who've been DXing for a few years may remember WTAK-1000 Huntsville's uh, unique (shall we say, not Yankee-friendly) sunset signoff announcement. The AM-1000 station is still around as WDJL. They are widely heard at signon and signoff. Also a good sunrise/sunset bet is all-sports WMSP-740 Montgomery. 50,000-watt WCKS-810 Jacksonville should be an easy catch, but is surprisingly rarely reported.

Mississippi:

For many years, your best shot at Mississippi was sunrise reception of WCPC-940 Houston. Their 50,000-watt daytime signal would blast into Wisconsin at sunrise many mornings. Just don't try to catch their puny 250-watt nighttime signal! WSAO-1140 Senatobia, just south of Memphis, is another good sunrise/sunset target. A 1550 station at Jackson used to be heard regularly up north, but this station has gone silent and returned its



WTNI-1640, your best bet for logging Mississippi.

license for cancellation.

Also, for many years, WVMI-570 was a good option for a sunrise/sunset Mississippi logging. And like the Jackson 1550 station, WVMI no longer exists. But here, the news is better. WVMI hasn't disappeared completely – they've moved to the expanded band, becoming WTNI-1640. WTNI's news/talk format is probably the easiest way to catch the Magnolia State.

Here's hoping your AM dial tour of

Dixie will color in a few more states on your map and a few more lines in your logbook. Next time, we'll visit Texas and the Delta.

❖ DX News...

January 20th was "the night of a thousand DX Tests." Well, OK, four DX tests... On the 13th, WISN-1130 Milwaukee's Chief Engineer Kent Winrich K9EZ ran an impromptu test. It was repeated the next weekend and included co-owned WOKY-920. Both tests were widely heard. I got a definite logging on WISN with plenty of mentions of the call letters and news items including a number of Milwaukee-area landmarks. (Mentions of "Wauwatosa" and "Teutonia" leave no doubt!) I missed the Morse IDs on both stations, though others heard them. I know I had WOKY – a strong station with WOKY's nostalgia format, on a frequency normally occupied by news/talk KARN Little Rock – but didn't hear any IDs, either voice or Morse, on this frequency.

But Milwaukee wasn't the only place where DX tests were happening that night. Tests were also arranged on KEVA-1240 Evanston, Wyoming, and WTTB-1490 Vero Beach, Florida. 1240 and 1490 are "graveyard" channels, home to enormous numbers of low-powered stations and tons of interference. DXers generally don't expect to get many results on these frequencies. DXers who made that assumption on the 20th missed an opportunity to hear some exotic DX. The KEVA test was heard in Maryland! I will sheepishly admit to not trying for this test. If it could make it to Maryland it should have made it here. Wyoming is extremely rare in the East, and on 1240 kHz it's an even more exotic catch.

❖ Pirate, or not?

Back in February I wrote about "mystery station" KBXZ-1650 in Flagstaff, Arizona. This station has a website indicating it carries ESPN Radio – but there is no record of any such station in the FCC database.

Rich Polukort writes from Flagstaff, noting that he cannot hear KBXZ from his home (even with a Drake R8B). On the car radio, the station is only audible near the Northern Arizona University campus, and even there only very weakly. It sounds like KBXZ is a legal Part 15 station.

❖ Harmonics: Stations that Aren't

Over the past few years there have been numerous reports of mystery relays of shortwave stations in the upper parts of the AM broadcast band. Radio Havana on 1697; Gene Scott (presumably via KAIJ, Texas) on 1615. None of these stations acknowledge BCB relays. So who's relaying them? Nobody...!

Since the 1920s, virtually every radio sold has used Armstrong's "superheterodyne" circuit. In this circuit, incoming signals are fed to one input of a "mixer." The other input is a "dead air" signal from a "local oscillator."

The output of the mixer contains four signals: the two inputs, their sum, and their difference. The frequency of the local oscillator is chosen so that either the sum or the difference is at the selected "intermediate frequency"; this signal is amplified, converted to audio, and sent to the speaker.

So, let's say you turn your radio's dial to 1700 to listen to KTBK. You turn the knob to 1700, and the local oscillator is set to 2155 kHz. The four signals out of the mixer are:

- * 1700 kHz, the KTBK signal from the antenna,
- * 2155 kHz, the local oscillator signal,
- * 3855 kHz, the sum of the two frequencies,
- * 455 kHz, the difference of the two.

The intermediate frequency amplifier is tuned to 455 kHz – the 455 kHz signal gets through, and you hear KTBK.

But... no oscillator is perfect. All oscillators have "harmonics": they put out signals on multiples of the desired frequency. When your radio is tuned to 1700, the oscillator's desired output is on 2155. But it also has a second harmonic on $2155 \times 2 = 4310$ kHz. And a third harmonic on $2155 \times 3 = 6465$ kHz. And so on. These harmonic signals also reach the mixer.

Let's consider that third harmonic on 6465 kHz. And on a hunch, let's consider a hypothetical powerful shortwave broadcast on 6010 kHz. What are the four signals out of the mixer?

- * 6010 kHz, the hypothetical 49-meter broadcast,
- * 6465 kHz, the third harmonic of the local oscillator,
- * 12475 kHz, the sum of the two frequencies,
- * 455 kHz, the difference of the two.

Yep, there's that magic 455 number again. The intermediate frequency amplifier doesn't know the 455 kHz signal resulted from a harmonic instead of the desired 2155 kHz signal. It will happily amplify the 455 kHz signal resulting from this shortwave broadcast, and you'll hear it. (In fact, the BBC World Service broadcasts on 6010 during "prime time" – but it's in DRM which means you'll hear noise on 1700, not audio...)

Now, let's consider some "real world" examples. Radio Havana on 1697? When tuned to 1697, your local oscillator is on $1697 + 455 = 2152$ kHz. The third harmonic is $2152 \times 3 = 6456$ kHz. $6456 - 6001 = 455$ kHz; when tuned to 1697, you'll hear a shortwave station on 6001 kHz in the 49-meter band. Look in the *Shortwave Guide* under Cuba at 0100 UTC and you see – Radio Havana is using 6000 kHz. Close enough.

Gene Scott on 1615? Local oscillator is on $1615 + 455 = 2070$ kHz. $2070 \times 3 = 6210$. $6210 - 5755 = 455$. The *Shortwave Guide* shows KAIJ Dallas, TX, operating on 5755.

The magic "intermediate frequency" varies with different radios. Inexpensive radios use low frequencies near 455 kHz – 450 and 460 are other common values. Often, the intermediate frequency is specified in the radio's manual or even printed on the back. Better radios usually use a much higher frequency – often on the order of 40 or 70 MHz. This puts the frequency to which the radio would "spuriously" respond a lot higher in the spectrum – also a lot easier to filter out. (With a 70 MHz intermediate frequency, the third-harmonic spurious response on a radio tuned to 1615 kHz would be in the 2-meter ham band. It's really easy to filter a 2-meter ham signal out of a receiver intended to pick up the broadcast band!)

I've considered only the third harmonic of the local oscillator here, because it's the one most likely to result in spurious responses from a popular shortwave broadcast band. Other harmonics do exist, and if a strong shortwave signal exists at the right point in the spectrum, you may well hear it in the broadcast band. Do note that the strength of these harmonics drops off quickly with the order of the multiple – the fourth harmonic is weaker than the third, the fifth is weaker still, etc. And remember that these spurious receptions are the fault of shortcomings in the receiver – the stations themselves are broadcasting only on the frequencies they're supposed to use.

❖ IBOC News

In April, I wrote "I'm not aware of any IBOC receivers selling for less than \$1,000." Charles Dube, chief engineer of WFCR in Amherst, Massachusetts, wrote with information about a couple of less-expensive options. Kenwood offers an IBOC tuner (KTC-HR100) for \$399; this must be used with a compatible analog receiver: Charles' is a KDC-MP425 which sells for \$160. Boston Acoustics is introducing a tabletop IBOC radio which will sell for \$299. And at least two other firms plan to offer IBOC receivers later this year. The Boston Acoustics set includes support for NPR's dual-program system, "Tomorrow Radio."

A number of DXers have noticed brief outages of the IBOC on a number of stations, followed by occasional nighttime IBOC operation on the same stations. IBOC is normally only allowed to operate between 6am and 6pm. Two of the stations involved have been WOAI-1200 and WLAC-1510, neither of which is known for being technically "sloppy." It is strongly suspected both stations had temporary authority from the FCC to test nighttime IBOC. (And it's my suspicion the preceding daytime IBOC outages were to make changes to the IBOC equipment.) Whatever they did differently, it didn't help. The adjacent channel interference is every bit as bad as it was.

At this writing a number of new IBOC-AM stations are reported operating, including WIP-610 Philadelphia, WTEM-980 Washington, and WOVO-1190 Fort Wayne. On the other hand, WLAC-1510's IBOC has been off the air for a couple of days...

❖ Till next month

Hearing anything interesting? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmit@monitoringtimes.com. Good DX!

Cold Weather Railscanning

I thought that winter was never going to end this year. We never got that much snow at one time, but it stuck around until spring in northern Indiana. It was cold, but summer is here now. I didn't get to shoot many pictures this winter with the zero degree temperatures. In fact, the geese were still flying south in March!

❖ Chasing the CF&E

A day off from work in January for Martin Luther King Day gave me an opportunity to chase trains. I caught a few trains on the Norfolk Southern and the Decatur turn on the Chicago, Fort Wayne and Eastern. This was the first day that I was able to chase the CF&E, even though it was only eight degrees F outside. The day was sunny, but it was bone chilling.



In the photo above, the train is pulling a string of hoppers just east of Adams Tower in Fort Wayne, Indiana. This train is running to the old Central Soya plant in Decatur, Indiana. The plant is now Bunge North America. The train was traveling very slowly and I almost froze solid while waiting for it to roll by.

This line was a part of the old Grand Rapids and Indiana Railroad. At one time, it ran from the Cincinnati area north through Decatur and on to Fort Wayne. Then at Adams Tower, the trains ran west to Junction Tower and on to Michigan. The line ran all the way north to Mackinaw City and ended at the boat dock. The Chief Wawatam car ferry carried freight cars across the Straits of Mackinaw to St. Ignace, connecting the GR&I with the SOO Line.

The CF&E is still using 161.070 MHz and 160.545 MHz for their operations in this area. I have been watching the Federal Communication Commission (FCC) website to see if the railroad has been issued their permanent radio frequencies.

❖ RoadRailers in Fort Wayne



In this photo, a Norfolk Southern RoadRailer heads toward Mike Tower with a string of nearly 100 trailers. I listened to the train as it approached the tower and awaited clearance on its way to St. Louis. I was tuned to 160.380 MHz for the communications with the dispatcher.

❖ Carrying Scanners in Indiana

A cautionary note: I carry my Motorola GM300 radio in the van so I can listen to the local railroad activity. It is legal for me to carry this radio in Indiana, since I am a licensed ham radio operator. In Indiana it is illegal to carry a scanner on your person or in any vehicle unless you carry a police permit or have an amateur radio license.

❖ Crossing Whistles

Have you ever sat waiting on a train at a crossing and heard the rhythm of the horn with the engineer's hand on the whistle cord? The whistle is a specific set of toots. The honks are a long, then another long, a short toot and then a long toot carried into the crossing. The locomotive engineer who began this pattern of sounds was from Fort Wayne and was the grandfather of my railroad buddy, John Reitz. John's grandfather worked for the Pennsylvania Railroad in the days of steam.

John works with me on my model railroad layout in the basement. He is National Model Railroad Association Master Model Railroader Number 316 and models a freelance railroad based on the East Broad Top Railroad in Pennsylvania.

❖ The "Hoosier Line" Railway

Modeling is one way to enjoy trains when it's too cold outside to chase the real ones. I am modeling a freelanced railroad based on the years 1945 through 1960. The railroad will have motive power painted for the Monon (The Hoosier Line), New York Central, and Erie-Lackawanna. The railroad will be named the Hoosier Lines Railway. That way I can use just about any equipment from any Indiana railroad. The reporting marks for my railroad will be HLRY.

I need to get 2-way radios for dispatching the model trains when I get the layout finished. The mainline is approximately 220 feet long with roughly 600 feet of total track on the layout. The control system is digital, and I have one 900 MHz remote radio throttle to use for controlling the locomotives. I can walk around the basement and operate the locomotives by remote control.

Some of the locomotives I own have sound units in them and realistically chuff and whistle as they operate on the railroad. The sounds are sometimes deafening! I have had to lower the volume on the locomotives, since they can be so loud as to be heard upstairs.

This is the first time I have built a large layout, and it has been fun. I have a number of buddies who come to work on the railroad with me.

❖ Steamtown Frequencies

A railfan from the Scranton, Pennsylvania, area sends along some of the channels programmed into the handheld radios used at the Steamtown National Historic Site in Scranton. Steamtown runs steam locomotives and some diesel trains. They use the trackage of the railroads in the area and also teach young railroaders skills they can use while working on the railroads.

Table 1 shows the channels and their uses. We welcome lists of railroad radio frequencies such as this for sharing with our readers.

❖ But officer, I didn't see it coming!

I was traveling home one evening and saw a train stopped down on Old Maumee Road. I got ready to shoot the power on this train awaiting clearance to roll into East Wayne Yard. As I drove around the bend in the road, I noticed three police cars and police officers



standing in the road. The locomotives were not near the signal. Then a red Mustang caught my eye. It was sitting nose-to-nose with a Norfolk Southern locomotive.

I turned around and snapped a picture of the incident but never saw an article in the newspaper about it. I did see a badly shaken woman in the back seat of one police car. I am not certain if she drove down the tracks in a stupor and hit head-on into the train or what. Luckily she appeared to be unhurt.

I was listening to the railroad channels and overheard the track supervisor call for a wrecker and then later check the tracks for damage. Once he deemed the tracks OK, the train rolled slowly into the yard.

❖ Yahoo's RailScan Group!

Check out the RailScan Group on <http://www.yahoo.com>. It is a website where railfans, or railroad enthusiasts, communications listeners, and professional railroaders chat about various aspects of North American railroad radio communications. We may converse about past, present and future topics. These topics include various commercial radio equipment used by railroads, and the use of scanners, amateur, FRS, GMRS, and MURS radio as railfanning tools. Members may also discuss the radio installations and related accessories, such as coax cable and antennas. Computer control interfaces and software are also discussed.

The group welcomes rail radio frequency updates from your location and communication-related questions from members planning vacations. Operational news pertaining to communications, such as changes to dispatcher's jurisdiction, talking detectors, APCO-25 digital, ATCS 900 MHz frequency allocations and other rail communications are discussed.

RailScan also welcomes discussions regarding the various rail scanner audio sites such as the RailScan feed on Shoutcast featuring audio from the northern New Jersey/New York City Metro area.

To listen to the RailScan live scanner audio feed on Shoutcast, members should visit <http://railscan.webhop.net>. Winamp player can be downloaded also for listening to the feed. One can download the free Winamp player at

<http://www.winamp.com>.

❖ New Milwaukee Channels

Tom Heiderer from Milwaukee, Wisconsin, reports the Union Pacific is now using 161.265 MHz and 160.545 MHz at Butler Yard for general switching duties. They are also using remote control locomotives at Butler. Signs advising that "the locomotive cabs may be unoccupied" surround the yard. Does anyone have an idea what frequencies they may be using?

Tom also reports that a new short line in northwest Wisconsin, the Wisconsin Northern (a division of Progressive Rail), is using 160.350 MHz, according to people living in the area. The FCC also shows 160.380 MHz and 161.115 MHz, but nothing heard on either of these. (Ed. Note: 161.115 MHz and 160.380 MHz are used in the Minneapolis, Minnesota, area of operation of Progressive Rail.)

❖ Butler County, Kansas

William Brown from Rose Hill, Kansas, sent in the Burlington Northern Santa Fe (BNSF) Railway and Union Pacific channels he listens to in Butler County.

BNSF Railway:

160.650 Road channel - Mainline
160.560 Road: Newton to Mulvane
160.425 Road: Wellington West
160.335 Maintenance of Way
160.935 Road: Newton West

Union Pacific

160.470 Road
160.410 Road
160.740 Road
160.515 Road

We thank William for his submission "to help with your column" and ask for more of the same from other readers.

❖ Want to buy a firecracker?

Point your browser toward http://www.antenna.com/lm_cat/lmrpg25.html Antenna Specialists makes this railroad antenna and fans have nicknamed it the firecracker. A number of railroads use this type of antenna. It has unity gain, but is fairly rugged. The antenna is brass and is easily painted by the railroad to match their color schemes. The antenna is readily available to the public.

That's it for this edition. We welcome your frequency lists for the column and any anecdotes concerning railroad radio for publication here in *MT*.

Until next time, make sure you don't get sidetracked in what you do.

Table 1: Steamtown Historic Site

Channel	Railroad	Transmit MHz	Receive MHz	Usage
1	Delaware-Lackawanna	161.460	161.460	Road
2	Delaware-Lackawanna	160.320	161.460	Repeater
3	Delaware-Lackawanna	160.245	160.245	Yard
4	Delaware & Hudson	161.475	161.475	Dispatcher
5	Delaware & Hudson	161.475	161.475	Road
6	Reading & Northern	161.310	161.310	Yard
7	Reading & Northern	161.370	160.770	Road
8	Not Applicable	N/A	N/A	N/A
9	Norfolk Southern	161.070	161.070	Yard
10	Norfolk Southern	160.800	160.800	Road

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Longwave News

Welcome to another issue of *Below 500 kHz*! We have a good batch of reader mail and loggings to present this month, including some intercepts made while aboard a cruise ship in the Caribbean! Your loggings, questions or comments are always welcome by either e-mail or postal mail. With e-mail, please be sure to include something meaningful in the subject line (such as "Below 500 kHz") so I don't mistake the message for unwanted "spam."

I mentioned last month that I was exploring a simple receiver design by Klaus Betke described at <http://longwave.bei.t-online.de/lfreqen.html>. While I feel this is a very useful design for its intended purpose, it does not appear to be the right solution for our needs. It is meant primarily for operation below 150 kHz, rather than in the beacon-band. It may be possible to modify the circuit for higher frequency work, but these changes would add complexity to the design and still would not allow stable AM reception, as I learned in discussions with the author. This regenerative receiver is meant to operate in oscillation-mode for use with data and time signals found below 150 kHz.

I am open to further suggestions readers may have for a simple receiver design. One approach might be to build a working receiver for the AM broadcast band, and then scale down the design for longwave reception. There are numerous circuits of this type available, and lowering the frequency should be primarily a matter of adding windings to the oscillator coil. For the time being, I am placing this project on the "back burner," but I welcome any input from readers and will report further developments here.

Cruising for Beacons

Ken Maltz (NY) took his longwave hobby to the high seas recently, and sent along the nice list of loggings shown in Table 1. Ken writes: "I recently returned from a 12-day cruise of the southern Caribbean on which I took my Sony ICF-7600G in the hope that I could do some shipboard DXing; knowing that it can be difficult to receive HF/LF stations on a large cruise ship, surrounded by so much steel. Nonetheless, I went out on our veranda, seven decks up, and managed to log several LF NDBs, using the radio's built-in ferrite loop antenna. Some of the catches were within a few miles and some within a few hundred miles. It was a lot of fun to go out on the veranda at night, rotate the radio and see what was out there!"

Thanks for writing, Ken, and for sharing your loggings. With today's smaller receivers, it is quite practical to take your hobby along while traveling, whether on land or sea. You never

know what DX you will hear when you change your listening environment.

Table 1. LF Beacon Loggings

(from S. Caribbean Cruise)		
Freq. ID	Location	
283	UZG	Zarago, Cuba
311	TBG	Taboga Is., Panama
330	CZM	Cozumel, Mexico
332	FIS	Fish Hook, Florida
344	ZIY	Grand Cayman, CYM
348	UHA	Havana, Cuba
356	PB	Rubin, Florida
360	KIN	Kingston, Jamaica
370	LMS	La Mesa, Honduras
375	GUA	Guatemala City, GTM
380	UCY	Cayabo, Cuba
387	SPP	San Andres, Columbia
388	AM	Picny, Florida
415	CBC	Cayman Brac, CYM
430	VA	Varadero, Cuba

156 Beacons and Counting...

Tom Wrensch, N9HR (WI) has recently discovered the fun of chasing beacons and adding entries to his logbook. He writes: "I only started chasing LF beacons this past December, and never thought that I could ever log 100 of them. I'm now up to 156 and still going. Receiving is getting tougher as the spring storms roll in. Just hearing the same beacons multiple days gives one a real sense for how propagation changes on the low frequencies."

"I also wanted to let you know that I presented a beacon hunting program at the February meeting of our local ham radio club. I now have a few converts that are just getting into beacon hunting. In my presentation, I passed around the *BeaconFinder* guide and played a few-minute clip from your cassette tape, *The Sounds of Longwave*. Our radio club is based in Watertown, Wisconsin, and has an airport with a beacon of RYV on 371 kHz. I took some photos of the transmitter, and passed them around at my presentation. I'm sending you two photos for you to have in your collection. (One is shown in Figure 1—K.C.) Keep up the great column in *MT* and 73."

Thanks for writing, Tom, and big *MT* kudos for doing a club presentation on longwave! I find that



Figure 1. Photo of Beacon RYV/371 kHz, Watertown, WI

many people, especially hams, are very interested in exploring the band, but don't know where to start in terms of equipment, reference materials, or in just understanding the behavior of the band. Club presentations are an excellent way to get folks started on this part of the spectrum.

New Hampshire Logs

We are also pleased to hear from Joe Majewski, WA1WRH (NH) who has discovered the fun of chasing and identifying beacons. Joe writes: "I've listened around in the low bands with my Sony 2010 a few times in the past, but last night from 0200Z to 0500Z I tried in earnest for the first time. I live in the SW corner of New Hampshire, at an elevation of approx 1500 feet. No special antenna was used, but I did find, with no surprise, that rotating the radio made a huge difference in reception. I've included a listing of beacons heard; for some I could find no identification on the Internet. I have tried to determine the unknown beacon frequencies as closely as I can, and have confirmed the Morse IDs."

Good to hear from you, Joe. It looks like you're off to a great start with your Sony 2010. That is an excellent rig for LF work, especially when it is connected to an external antenna. Your logs appear in Table 2 below, and I've added IDs to the ones not found online, with the exception of BCT/413. I could not find a listing for this station in any of my resources. The others were identified with the *BeaconFinder II* directory and are shown in italics.

That wraps up another month. 73, and best LW DX!

Table 2. New Hampshire Loggings

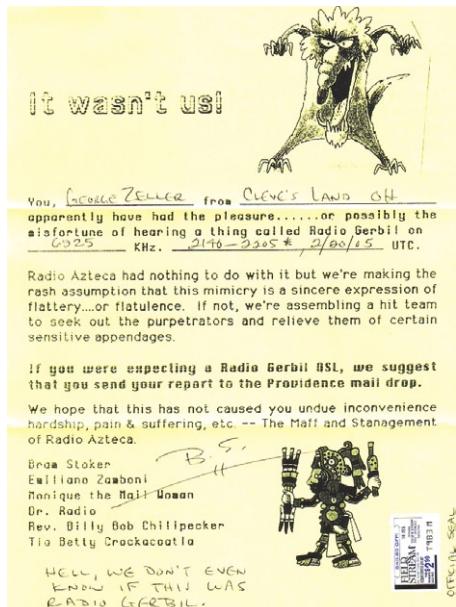
Freq.	ID	Location
205	ORE	Orange, MA
216	CLB	Wilmington, NC
248	UL	Montreal, QC
279	RS	Worcester, MA
289	YLQ	La Tuque, QC
317	ZMX	Janvier/Montreal, QC
332	BE	Bedford, MA
340	YY	Mont Joli, QC
341	YYU	Kapuskasing, ON
351	YKQ	Waskaganish, QC
359	AS	Nashua, NH
363	RNB	Millville, NJ
365	FIT	Fitchburg, MA
366	YMW	Maniwaki, QC
373	2Q	Mont Laurier, QC
375	LQ	Springfield, IL
378	RJ	Roberval, QC
392	ML	Charlevoix, QC
394	YB	North Bay, ON
404	ZYB	Yellek/North Bay, ON
414	BC	Baie Comeau, QC
415	BCT	Unidentified station
417	EK	Worcester, MA
	YWA	Petawawa, ON
516		

The Future of Radio

Well known DXer Harry Helms has started an internet blog devoted to a discussion of the future of radio. Although the volume of postings on this blog about pirate radio is small, it is a very interesting contribution to the ongoing war between licensed local broadcasting stations, satellite radio, wi-fi, cell phones, and other rapidly evolving technologies. You can check out Harry's blog at <http://futureofradio.typepad.com/>. The blog is thought provoking, and it is well worth a visit.

❖ Radio Gerbil vs. Radio Azteca

Bram Stoker at **Radio Azteca** is probably the best producer of current pirate radio comedy in North America. Recently, another station, using a variety of identifications including **Radio Gerbil**, has been airing a very funny parody of Stoker's shows. As we see here this month, Mr. Stoker denies that he produces the parody of himself.



❖ SW Radio Africa

A new quasi-clandestine station has appeared in Zimbabwe. The latest announced schedule for the London, UK, based, independent **SW Radio Africa** is periodically updated on the station's web site, found at <http://www.swradioafrica.com/> on the internet. Their 15145

kHz broadcast for two hours at 1800 UTC has been widely heard in North America. Also, 12145 kHz from 1800-2100 UTC is worth a try. One hour at 2000 UTC on 11770 kHz is also scheduled.

At 0300 UTC their 3230 kHz frequency on 90 meters sometimes gets out to North America. For a real DX challenge, you can try 1197 kHz medium wave for two hours at 0500 UTC. At 1600 UTC they are noted on 11845 kHz as well. There have been reports that the Zimbabwe government regularly jams the **SW Radio Africa** signals.

❖ Switzerland in Sound

We have mentioned many times that the only shortwave broadcasts left in Switzerland are the pirate efforts of DJ Stevie at **Radio 510**. But, the spirit of Swiss shortwave broadcasting is still alive. Bob Zanotti, well known as half of the old "Two Bobs" on the now-defunct **Swiss Radio International**, announces that he has started a "Switzerland in Sound" web site. He continues radio feature reporting from Switzerland via the web site. You can download his reports from Switzerland at <http://www.switzerlandinsound.com/index2.php?site=whowear.html>

Meanwhile, the Swiss government has announced substantial budget cuts to their Swissinfo web site at <http://www.swissinfo.org/> that was originally designed to replace **Swiss Radio International**.

❖ WHBH Returns?

Jacob Klee points out that somebody has been relaying old **WHBH** programming via an FM pirate on 97.7 MHz in Richmond, VA. This station used to broadcast on shortwave until it was busted by the FCC in 1990. Has anybody else been hearing this one?

❖ What We Are Hearing

Monitoring Times readers heard nearly two dozen different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regular announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but the primary North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz remains the best place to scan for the pirates. More than 90% of all North American shortwave pirate

broadcasts are heard on or near 6925 kHz.

Ann Hoffer Radio- They continue to feature music selections by this artist. (Uncertain; try Belfast)

Bozo Radio Network- This pirate provides rock music and inside jokes for pirate radio fans. (None)

Ground Zero Radio- Dave Gunn claims to broadcast from an abandoned missile silo. Like many other pirates he features rock music and parody material. (Elkhorn)

KRMI- They have nothing to do with **WRMI**, but instead the call letters stand for Radio Michigan International. (Elkhorn)

Pirate Radio Boston- Charlie Loudenboomer plays rock music, but given his name it is no surprise that the station also broadcasts comedy. (Uses pirateradioboston@yahoo.com e-mail)

Punxsutawney Radio- Pirate radio activity always picks up around holidays. The groundhog was the inspiration for this one. (None)

Radio Novocain- This relatively new one features rock music, but it is not clear if it makes you numb. (Not known yet)

Take it Easy Radio- This veteran pirate uses the song by the Eagles as their theme song, but they also play a variety of other rock music. (Merlin and takeiteasyradio@yahoo.com e-mail)

The Crystal Ship- The Poet still sends out rock music on political commentary on a variety of unpredictable frequencies including 6925, 4071, 4510, 4700 and 6857 kHz. (Belfast and tcshortwave@yahoo.com e-mail)

The Mule- This odd new station claims to be a new name for the formerly obscure Government Mule Radio. (Elkhorn)

Undercover Radio- Dr. Benway mixes rock and pop music with pirate radio commentary: "from the middle of nowhere." (Merlin and undercoverradio@mail.com e-mail)

Voice of Captain Ron Shortwave- Captain Ron still transmits hard rock music. (Uses captainronswr@yahoo.com e-mail)

Voice of Pancho Villa- The longtime Voice of the Winter SWL Festival appeared once again in March, but you can also occasionally hear Pancho via relays by other pirates. Several years worth of shows are at <http://pix.dkosmedia.com/> (Blue Ridge Summit)

Voice of the Runaway Maharishi- The Maharishi Ali Ganja uses a rock music and drug advocacy format. (Belfast)

WEAK- Leonard Longwire still hosts the rock music and comedy on this station. (Uses weakradio69@yahoo.com e-mail)

WHGW- Old time radio dramas and rock music are the usual fare on this one. (Uses whgw6925@myway.com e-mail)

WHYP- James Brownyard is still with us from North East, PA with pirate comedy and temperatures for Lake Erie cities. (Providence)

WKIL- Jack Black is the announcer on this relatively new rock music pirate. (Unknown)

WKZP- Originally active in the late 1980s, this one has rarely been heard since 1991, but they are back with rock music. (Blue Ridge Summit)

WMPR- In what has become an annual tradition, this mysterious "Dance Party" rock music pirate once again distributed about a dozen QSLs at the March Winter Shortwave Listeners Festival in Kulpsville, PA.

continued on page 61

Shaking Up the Ham Shack

Okey, I'll admit I sometimes find myself at a loss for a topic for this column. My own tendency in ham radio activity is to stick to one or two aspects for long periods of time, but nobody would want to hear me go on about the particular project I have going in my basement lab for months on end. So, in order to keep things fresh I try to keep my eyes open for new ideas. (Don't forget I welcome suggestions from readers as well.) But, right before I was ready to sit down to type up this column, a great subject, literally dropped into my lap. Or, at least, the cause of the idea did.

At this year's Kulpsville Winter SWL Fest, I was the lucky winner of one of the major door prizes, that being a Ten Tec RX320 "black box" receiver. (Many thanks to the folks at Ten Tec for making this prize available.) My good fortune put me into the position of needing to give some serious consideration to changing my station set-up. This was the first major overhaul of my operating position since moving to this location over 5 years ago.

The PC – An uneasy stepchild becomes part of the family

A little background may be useful here. I already have one PC-controlled rig in the shack – an ICOM PC1000. This DC to daylight receiver has been a useful tool in both my HF and VHF/UHF ham activities (as well as for general radio monitoring fun). The Ten Tec RX320, with its noticeably higher performance in the HF bands, was a welcome addition. And, while I had added the computer port board to my Elecraft K2, I never really played with it that much. The same goes for my packet and PSK32 operations.

Everything was there, but it all tended to be a kludge. Up until now, I hadn't fully integrated my computer systems and my ham shack. I tended to depend on a couple of overly long "QRN Antennas" in the form of RS232 cables across the floor to my main PC. It was time to think about bringing my ham shack into the twenty-first century, even though my main operation still leaned toward good old fashioned CW on the bottom end of 40 meters.

Taking the sage advice of no less a mentor and highly experienced ham than Bob Grove W8JHD, I knew that, in most cases, a laptop computer generated less noise in the ham shack than a traditional desktop PC. I was already using a laptop around the shack, so I decided to integrate this tool into the center of my ham

operations. By placing this keyboard-based device at the center of my desk, moving my transmitters to the left and my receivers to the right (I am right handed), my station began to take on the appearance of a classic shipboard CW operator's station. Only, in my case, the laptop sat where the old "mill" typewriter used to sit.

A note on laptops that every ham and other radio monitoring hobbyist needs to consider: Modern laptops, and even modern operating systems such as Microsoft Windows 2000 and XP, aren't all that serial port friendly. Most of the radio control systems and program applications in current use still depend on the RS232 serial interface. Very few current laptops even have a serial port on them anymore. USB to serial adapters do not always work.

This is not necessarily a bad thing for a cheapskate radio hobbyist. Many great deals can be found on older laptops that are perfect for ham use. Keep an eye out and you may just find a way to modernize your shack for very little expense.

The Wires – Access without anguish

Now, back when I started in this hobby, you really didn't have all that many wires running around the shack. An antenna, a key and/or microphone, power, ground, maybe a set of headphones. Not much to get complicated or tangled, right? Well, if your operating position is anything like mine, you may have noticed that those wires and cables behind your desk have multiplied by several factors. More than one project of mine has stalled at the gate due to a general laziness associated with needing to pull gear out to play with the wires behind it.

Since I was doing a full reassessment of my shack desktop, I began to think about how to make wire swapping and switching less of a chore. Especially since now, in addition to the

above mentioned radio connections, I had to allow for serial ports, sound card audio lines, and a few other miscellaneous connections to really take full advantage of all that my shack equipment had to offer.

Whenever I am thinking about building anything, I can move my perception "out of the box" by taking a walk around my local hardware emporium. Any dedicated free thinking builder/experimenter will tell you that many items found in hardware stores can be turned to uses never considered by their designers. Remember, we have a couple of ham satellites up there that have pie pans as part of their antenna systems. (The houseware departments can be as valuable as the hardware departments to a radio hobbyist.)

I truly love turning mundane hardware to new uses, and this project gave me just such an opportunity. I hit on the notion of making the radio equipment shelves into a single movable unit. To this end, I picked up a number of 12-inch wide by 3/4-inch thick pieces of laminated pine plus all the necessary hardware to construct an integrated section of shelving to hold my various radio toys.

Now comes the fun part. In poking around the hardware store, my eyes landed upon medium duty, ball bearing, flat drawer slides used in general cabinet making. By putting four of these ball bearing slide systems under my shelving unit and then anchoring the whole shebang to my desktop, I now had a radio position that allowed me to easily slide the shelf unit out to provide easy and ready access to the many cables and wires that hang behind the transceivers, receivers, accessories and requisite laptop computer as needed. (This is the point in the article where everybody has my full permission to place their hand on top of their head and say "Now why didn't I think of that?")

Remember folks, I've been playing with this stuff for over 30 years and I just got the idea because I was wandering down the right aisle of my local hardware store at the time my



Photos of my shack before and after the modifications



tangential mind was willing to go off in that particular direction. Coming up with new and different ways of playing radio is why this hobby is so much fun in the first place.

By building this integrated shelf unit, I was easily able to widen the radio shelf space from the 5 feet of the desktop and its adjoining file cabinet to over 6 feet. I could have gone even wider had the room's size and other furniture allowed. This extra foot of space not only gave my desktop equipment a bit more room to breath (and eventually grow), it allowed me to move my power supplies down to the floor at the left of my desk nearer where the mains power comes into the room and directly next to my solar/battery backup system.

So now the shack set-up is more or less modular. On the left side I have the power generation all together. Above that are the main antenna switches and antenna tuners (putting them directly next to the place where the antenna feeds come into the house). This means I have the transceivers placed so their power runs and links to the antenna tuners are as short as possible. In the middle of the desk I have the laptop. And, finally, on the right I have my receivers and my handhelds fed off their own stripline power source coming over from the power section. Altogether a nice orderly way of doing radio business.

❖ Putting power in its place

Speaking of power... My shack had originally been built up around the earlier "Molex" power connector standard established for ARES/RACES radio hobby emergency service a number of years ago. That means that all of my 12 volt radio connections utilized Molex power connectors to assure standardized polarity and power capability when in the field.

Recently, a new standard has come into play – the Anderson "Power Pole" connector (<http://www.andersonpower.com>). The Power Pole system is a notable improvement over the previous way of doing business. The connectors are genderless, polarized and can be fitted to handle various power levels. The ARES/RACES standard is built around the 30 Amp connector which has been tested out to over 100 Amps, so this connector is seriously over-engineered and durable. I had built up a couple of Molex to Power Pole "Tweeneries" to keep body and soul together, but, since I had the whole station wiring harness out, I figured it was time to get with the program. I bought a bunch of Power Poles and set about crimping a new wiring harness together.

I also took the opportunity to "cull the herd" a bit, moving some equipment off of the primary operating position and into backup or collector status. For example, my HW-9 is now in a place of honor with my HW-7 and HW-8, displaying the history of Heatkit QRP rigs.

❖ Final touches

Since I had everything disconnected and off the shelves (in some cases for the first time in years), it made sense to give each piece of equipment a serious visual inspection and cleaning before jamming things back onto the shack desktop. A good number of dust bunnies had in-

filtrated a few undesirable places so it was worth the time and effort to keep things functional. Needless to say, the new movable shelving will allow for easier cleaning in the future. Testing of all cables and connectors was also part of the general reconstruction of my operating position. Even high quality connectors can develop just enough corrosion to make your life miserable in the midst of a contact.

In bringing everything back together I made liberal use of surplus "snap-on" chokes, especially on keyer lines and audio cables. I suggest you use only shielded cables for all lines. I also put chokes on the power cables, but this may be a bit of overkill. I had them lying around the shack so I made use of them. In actual practice, over the years, my only experience of stray RF getting someplace it didn't belong occurred when I left a keyer line a bit too close to an open wire feed on a 80 meter dipole.

I suppose I am worried a bit less these days about stray RF than I am about transient noise between any of those many cables and my receivers. But figuring out such things is all part of the fun. I expect many sessions of signal tracing in an attempt to improve my station's overall performance. Remember, I am a ham who enjoys poking around with my gear possibly even more I enjoy getting on the air.

No two ham shacks are alike. It's fun to compare notes and come up with new ideas in order to make the ham radio hobby more enjoyable.

So what is going on here at N2EI with this new and improved operating system? Probably not a lot; summer is here and it's time for me to take my QRP portable station out on my mountain bike. There are always lots of fun things to do in the greatest hobby of all!

Have fun. I'll see you on the bottom end of forty meters, probably from somewhere in the New Jersey Pine Barrens.

UNCLE SKIP'S CONTEST CALENDAR

Asia-Pacific Summer Sprint, (SSB)
Jun 11 1100 UTC - 1300 UTC

West Virginia QSO Party
Jun 18 1600 UTC - Jun 19 0200 UTC

ARRL June VHF QSO Party
Jun 11 1800 UTC - Jun 13 0300 UTC

All Asian DX Contest, (CW)
Jun 18 0000 UTC - Jun 19 2400 UTC

SMIRK Contest
Jun 18 0000 UTC - Jun 19 2400 UTC

Kid's Day Contest
Jun 18 1800 UTC - 2400 UTC

Marconi Memorial HF Contest
Jun 25 1400 UTC - Jun 26 1400 UTC

ARRL Field Day
Jun 25 1800 UTC - 2100UTC, Jun 26

QRP ARCI Milliwatt Field Day
Jun 25 1800 UTC - Jun 26 2100 UTC

His Maj. King of Spain Contest, (SSB)
Jun 25 1800 UTC - Jun 26 1800 UTC

Outer Limits continued from Page 59

(None, has QSLed only at the Fest)

WNKR- Channel Z has been relaying this United Kingdom Europirate here in North America. (Try channelzradio@gmail.com e-mail for Channel Z)

WSPY- The pirate radio spy station still transmits an odd mix of numbers transmissions, telephone audio tones, and rock music. (None)

❖ QSling Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations, especially in Europe where the value of the US dollar is plunging rapidly. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 69, Elkhorn, NE 68022; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for submitting pirate loggings with a hope that pirates might QSL the logs remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@ican.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net> on the internet, and a few pirates will occasionally QSL a web site report left on the FRN.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: John T. Arthur, Belfast, NY; Artie Bigley, Columbus, OH; Jerry Berg, Lexington, MA; Chris Campbell, Columbus, OH; Ross Comeau, Andover, MA; Richard Cuff, Allentown, PA; Rich D'Angelo, Wyomissing, PA; Bill Finn, Philadelphia, PA; Harold Frogge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Wimberly, TX; Jacob Klee, Richmond, VA; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Dan Malloy, Everett, MA; Mark Morgan, Cincinnati, OH; Lee Reynolds, Lempster, NH; Fred Roberts, Germany; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Bryan Smith, Bethlehem, PA; Niel Wolfish, Toronto, Ontario, Joe Wood, Greenback, TN and Bob Zanotti, Emmet, Switzerland.

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Antenna Types: Helical Antennas

In the previous columns in this series we have discussed antennas developed by Heinrich Hertz, and also some descendants of those designs. Antennas which developed more or less independently of Hertz's work include, but are not limited to: log-periodic designs, multi-element phased arrays such as the Sturba Curtain and the Franklin phased collinear antennas, various direction-finding arrays, turnstyle, slot, horn and open-end wave guide types, the Beverage, the discone, and the helical antennas.

This month we'll take a look at the two most common helical-antenna designs.

❖ Helical Antennas

A spiral shape such as that of a coil spring is called a "helix." There are two common types of antennas made in the form of a helix. If the antenna's helical coil circumference is much smaller than one wavelength at the frequency at which the antenna operates, then the antenna will radiate perpendicularly to the axis of the helix. Such radiation is called "normal-mode," "radial mode," or "broadside" radiation. Normal-mode helical antennas are shorter and have a more narrow bandwidth than linear antennas which are resonant at the same frequency.

If the circumference of the loops of the helix is approximately one wavelength, then the antenna will radiate in both directions along its axis. If a conductive reflector is placed at one end of such an axial-mode helix (fig. 1) the antenna's radiation and reception

pattern becomes unidirectional. The pattern's major lobe is then in the direction away from the reflector through the helix. As the number of turns is increased on this antenna, its gain and directivity increase. It has a very broad bandwidth compared to an ordinary linear antenna, such as a half-wave dipole.

The size of axial-mode helical antennas makes them relatively impractical at HF and lower frequencies. They begin to become more manageable in size at VHF, and much more reasonable in size at UHF and microwave frequencies.

❖ Let's Make an Axial-Mode Helical Antenna

Equations for designing an axial-mode helical antenna are given in fig. 1.

The coil for the helix can be 1/4 inch tubing (pinch and solder the ends closed), heavy wire, or the outer conductor of coaxial cable (solder the inner conductor to the outer at both ends, or remove it). Conductors of smaller diameters have been used with good results, but give less-broad bandwidths. I found that one of the sauce pans in our kitchen made a good form to shape the circular windings of my helix.

In order to match the antenna's input impedance to a 50-ohm feed line, the helix comes off the feed point connector very close (1/8 in.) to the reflector. It then slowly raises to 1 in. at 5 in. from the connector, then to 3-3/8 in. (this is measurement "g" in fig. 1) a half-turn out from the connector.

Conductive material such as galvanized metal, aluminum or copper sheet metal, or galvanized hardware cloth can be used for the reflector. Brackets may be necessary to hold the reflector rigid. For strength my hardware cloth (1/4 in. holes) reflector was reinforced with a masonite panel.

The helix supports must be of non-conducting material such as dry wood (varnished for outside use), plastic or fiberglass. The helix supports were 3/4 x 3/4 in. wood which was held to the reflector using large sheet-metal screws with very-large washers. The windings may be kept in place on the supports using glue and notches in the supports, string, wood pegs, etc. No conductive material is used here, either. The construction you choose must fit your intended use of the antenna. Mine is used in temporary situations, and never left out in bad weather. You should use more durable construction if you plan to leave your antenna permanently outside.

The mast is of 3/4 in. thick wood, and is held to the back of the reflector bolted between two wood brackets (fig. 1).

As with any antenna, don't work on this one when it is transmitting and stay out of the path of its beam when it is transmitting. If you mount it outdoors, use some kind of lightning protection. The minimum is to never use it during weather likely to produce lightning and disconnect and ground it when it is not in use.

RADIO RIDDLES

Last Month:

For last month's Radio Riddle I said: "The above discussion has been concerned with antennas receiving signals. Can the antennas we've discussed be used for transmitting as well? And if they can, will they have the same increased gain and directional performance for transmitting as they do for reception?"

To answer this let's consider something called antenna "reciprocity." This means that an antenna's performance characteristics, such as radiation-reception patterns, feed-point impedance, and radiation resistance, remain the same whether the antenna is used for transmitting or receiving. Thus, an an-

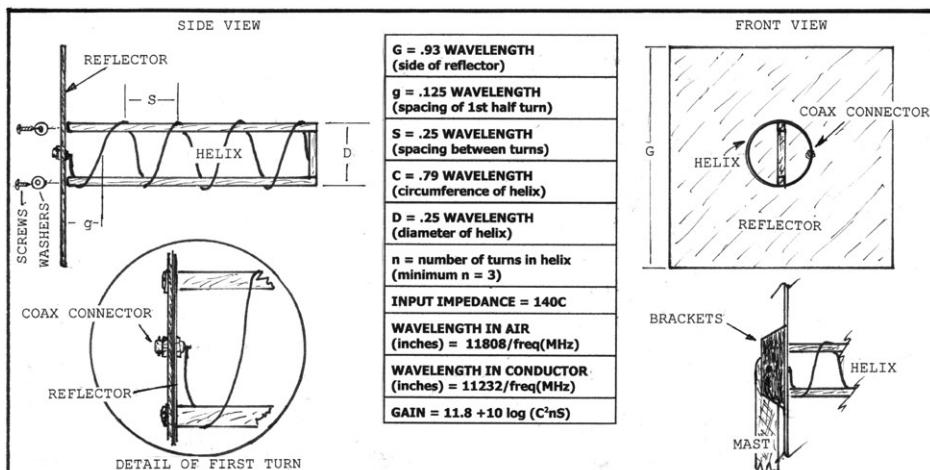


Fig. 1. An axial-mode, helical antenna with equations for determining its dimensions at the frequency at which it is to be operated.

This Month's Interesting Antenna-Related Web site:

An antenna tutorial with discussion about radial antennas:
http://www.micrel.com/_PDF/App-Notes/an-23.pdf

This next one gives a good overview of antenna terms and types of antennas:
[http://encyclopedia.laborlawtalk.com/Antenna_\(electronics\)#Antenna_Effectiveness](http://encyclopedia.laborlawtalk.com/Antenna_(electronics)#Antenna_Effectiveness)

Here's a complete, free, U. S. Navy course on antennas, transmission lines, and wave propagation:
<http://www.cs.tcd.ie/Stephen.Farrell/iph/background/US-Navy-NEETS/Module10-14182.pdf>

tenna whose radiation patterns tend to favor transmitting in certain directions will favor reception from those same directions. And an antenna, which offers its feed line 50-ohms impedance at its feed point when transmitting, will offer that same impedance for reception. And so, due to antenna reciprocity, the answer to our riddle is "yes."

It is of interest here to mention that some antennas seem to perform counter to the reciprocity principle. It's true that some antennas – for example, small "desk-top" loops and the Beverage wave antenna – serve better for reception than for transmission. These antennas with their sharp directivity and rejection of interference do function well for reception where received noise and interference are a problem (generally below 30 MHz). Their

reduction of noise and interference often improves reception a great deal. However, their interference/noise-reducing features are of no value when transmitting. Due to low gain and/or low efficiency, most antennas of these types perform poorly for most transmitting purposes. It is these features rather than any lack of reciprocity that makes them more useful for receiving than for transmitting.

It's also true that active antennas are often referred to as receive-only antennas: antennas that can't be used for transmitting. However, active antennas are, strictly speaking, not really antennas. An active antenna is a receiving preamplifier with a small antenna element attached to its input. It is the receiving preamplifier that makes them unsuitable for transmitting. The only actual "antenna" component of the active antenna is its antenna element. If this element were used without the preamplifier it would have the same characteristics for transmitting as for receiving. Just as with other antennas, the antenna element of the active antenna would obey the principle of reciprocity.

This Month:

The axial-mode helical antenna discussed this month transmits signals with what is called "circular polarization." Do all antennas with circularly shaped elements produce circular polarization? And can any antennas with non-circular elements yield circular polarization? And what is "polarization" anyhow?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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Putting a Signal Tracer Through its Paces

Last month we completed checking out the Heathkit IT-12 and Eico 147-A signal tracers. It remained only to fabricate the required test prods before we would be in a position to try one of these units under actual operating conditions. I hope you'll forgive me for equipping and testing only the Eico instrument. The design of the Heathkit model is so similar that there would be little more to be learned from working with it. Since the Eico unit has a few more features, it's the one that will have a permanent spot on my workbench.

❖ Making the Test Probes

Unlike the Heath unit, which has a single test probe which is switchable to accommodate either r.f. or audio inputs, the Eico instrument requires a separate probe to accommodate each function. The r.f. probe has a built-in detector circuit consisting of a semiconductor diode in series with an 470k isolating resistor. It's wired, via shielded cable, to a screw connector for attachment to the r.f. input of the instrument. The cable shield is grounded to the body of the screw connector at the instrument end and, at the probe end, is connected to a spring clip for grounding to the radio chassis under test.

The audio probe contains no circuitry and is simply wired straight through, via shielded cable, to a pair of pin tips for connection to the ground (pin tip from cable shield) and audio input jacks of the 147-A. A ground lead is connected to the cable shield within the body of the probe and exits the back of the probe, where it is terminated in a spring clip for grounding to the chassis under test.

Rummaging around in my box of surplus cables, I found a couple of shielded ones that would serve very well as a basis for the test leads I was going to need. One of them already

had, at one end, a set of pin tips connected to its ground and hot lead. It would be perfect for the audio cable. I removed and saved the connector at the other end and replaced it with a spare test prod from the same junk box. The needle tip of this prod could be temporarily unscrewed from the plastic body, making it very easy to wire the cable to the tip and to the ground lead that would exit the back of the body.

The other shielded cable from the "surplus" box was very close to what I would need for the r.f. test lead. It had a screw connector of the right type for attachment to the r.f. input of the instrument. The other end was terminated in a plastic body containing a circuitry compartment from which emerged wires, with spring clips, for use as ground and "hot" connections. All I had to do was remove the old components from the compartment and replace them with the required diode and isolating resistor.

❖ Wattage Indicator Check

With the test leads completed and set aside, I began by checking the instrument's wattage indicator circuit. The idea of having a wattage indicator is to determine whether the radio being tested is drawing the power, in watts, indicated on its identification tag. If it is substantially more, then there is trouble brewing – perhaps in the form of a leaky capacitor or two.

Rather than using a radio, I plugged a lamp with a 40-watt bulb into the instrument's wattage-test outlet and set the controls appropriately. The idea is to rotate the wattage test potentiometer until the instrument's "magic eye" indicator just closes. The arrow on the pot is then supposed to point to the wattage being drawn. It pointed to 42 watts. Close enough!

❖ R.F. and A.F. Tracing

I decided to use my National NC-57 receiver to test the Eico's signal tracing function. The restoration of this receiver was just completed in the April issue and the bottom cover was still off – giving me access to all of the test points I would need. Turning on my r.f. signal generator, I used it to feed a modulated 600-kHz signal into the front end of the receiver as suggested in the Eico manual.

Hooking up the r.f. probe and setting the Eico's controls to "Trace" and "RF," I was

able to use the probe to pick up the test signal at the control grid and plate of the r.f. amplifier, mixer, and first and second i.f. stages. I could hear the signal in the test speaker and see an indication on the tuning eye at each stage – and I needed to reduce the setting of the gain control to maintain the same indication on the magic eye as I progressed through the receiver. This was an indication that the signal was being properly amplified at each stage.

There was a certain amount of hum interference present in the earlier stages of the receiver because of high setting of the gain control required to pick up the low level signals. Perhaps my test lead is a little too long. Switching to the audio probe and resetting the controls for audio tracing, I was able to pick up a clear signal at the grid and plate of the first audio and audio output tubes.

These tests were enough to satisfy me that the 147-A is in good working order and ready for use on the next service problem. For a more detailed discussion of how a signal tracer is used to isolate problems, see the discussion at the end of the April 2005 issue.

❖ The RCA/Rider Chanalyst

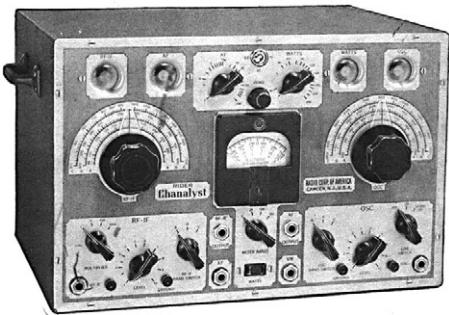
With our discussion of simple signal tracers complete, I thought you might be interested in seeing what a really advanced instrument might look like. I'm talking about the RCA/Rider Chanalyst. This was an instrument designed by radio service writer *par excellence* John F. Rider and was later marketed by RCA. The Chanalyst was introduced to the radio service trade in the late 1930s and was quite popular for several years thereafter.

Similar instruments marketed by other manufacturers were the Meissner Analyst (available in kit form) and the Hickock Tracemeter. These units looked quite different physically from the Chanalyst, and the Tracemeter used a battery of meters to monitor gain levels instead of the tuning eye indicators employed by the other units. Nevertheless, the basic circuitry and operating features of all three instruments are virtually identical.

I happen to own an example of each of these units, though I haven't gotten around to checking them out and setting one up for operation. I don't know if it would be appropriate to write up one of these up for the column because – while not exactly rare – they don't show up in flea markets and hamfests

The Eico 147-A as set up for r.f. signal tracing in the National NC-57.





You might call the RCA/Rider Chanalyst a signal tracer gone to heaven!

nearly as often as the hobby-type signal tracers we've just finished discussing. They are quite interesting, though, and this seems to be a very appropriate time for a once-over-lightly discussion.

While the Eico or Heath units we've been discussing can look at just one circuit point at a time, the Chanalyst and its relatives can look at several circuit points simultaneously — and it can monitor the action at these points in a much more sensitive and precise manner. In order to do this, it's equipped with five independent monitoring channels: the r.f.-i.f. channel, the oscillator channel, the a.f. channel, the electronic voltmeter channel, and the wattage indicator channel.

❖ Understanding the Channels

The r.f.-i.f. channel is really a complete multistage radio receiver (minus the audio amplifier). It covers the frequency range of 96 kHz to 1700 kHz — which includes most i.f. frequencies as well as the standard broadcast band. The level of the incoming signal can be measured quite precisely, over a wide range, using the channel's tuning eye and associated "level" and "multiplier" controls. Because this is a sensitive receiver rather than just a rectifier probe connected to an audio amplifier, the r.f.-i.f. channel can pick up the faintest signals present at any r.f. or i.f. stage of the radio being tested. It can even be connected directly to the

outside antenna, if the set has one, to measure the strength of the incoming signals.

The oscillator channel is also a radio receiver, but not nearly as sensitive as the r.f.-i.f. channel. Its range is 600-15000 kHz and its function is to check the level and frequency of the oscillator signal in the radio being tested. Level is indicated by means of the channel's magic-eye indicator and calibrated gain control. Frequency is read from the tuning dial. Since intermittent receiver operation is often caused by oscillator problems, it can be very handy to set up this channel to constantly monitor oscillator operation while checking the operation of the other stages of the receiver.

The audio channel is simply a single-stage, high-gain audio amplifier that can accurately measure audio voltages between 150 and 50,000 kHz. Indication is via tuning eye and calibrated level control. A two-position multiplier switch allows measurements over a range of .1 to 1000 volts with an accuracy of between 15 and 20 percent. By using the voltage measurement facility, a receiver's audio stages can be checked for proper gain.

The audio channel has a headphone output jack that can be used to monitor signals at any point in the audio system for distortion and/or hum. The r.f.-i.f. channel has a similar output jack for checking audio in the r.f. and i.f. stages.

The electronic voltmeter channel is a d.c.-only vacuum-tube voltmeter with ranges of +/- 5, 25, 125 and 500 volts. Vacuum-tube voltmeters were very rare in the 1930s and must have seemed like quite a boon to the radio serviceman owning one for the first time. Because of its extremely high input impedance, the instrument can be used to measure voltages anywhere in the radio receiver with the signal present — even at the control grids of tubes — without disturbing the operation of the radio. It could even be used to measure the voltages of Mallory bias cells (common in the late 1930s), which could not tolerate current drain in excess of a few microamperes.

Through the use of jumper cables, the electronic voltmeter can be connected to the

control grid of the r.f.-i.f. or oscillator channel magic eye tubes to give more precise indications than can be read from the calibrated level controls.

The wattage indicator channel works exactly like the wattage "channel" we checked out in the Eico 147-A. Plug the set into the special outlet, turn the calibrated control until the eye just closes, and read the wattage off the control scale. When turning on the set to be repaired for the first time, it was considered good practice to monitor its wattage and (using the electronic voltmeter), the voltage on its B-plus line. If the former was high and the latter low, there was probably a short somewhere. The set could then be immediately shut off and further testing postponed until the short was cleared.

❖ What's Next?

The Chanalyst and its relatives are interesting instruments indeed, and there is no modern equipment that can look at so many stages of a radio at once. The closest thing that might approximate it would be a dual-trace 'scope. But, even equipped with appropriate tuned circuits and detector probes, it wouldn't come close to matching the versatility of the Chanalyst, Analyst or Traceometer.

This concludes our discussion of signal tracers. What's our next project? I'm turning over a few possibilities in my mind. We might take another flyer into World War II surplus receivers, but I'm not sure. Tune in next time and find out!

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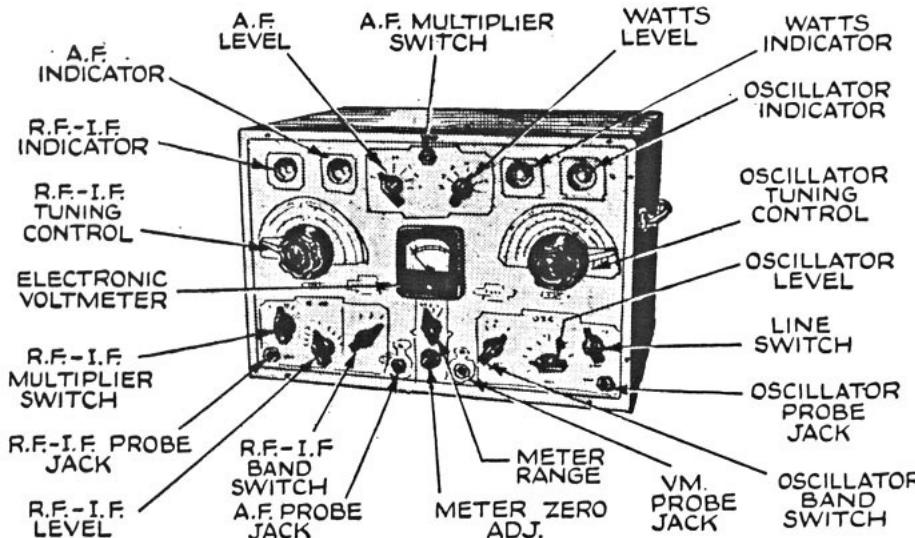
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A key to the controls and jacks on the RCA/Rider Chanalyst.

Those Strange Motorola Type II and Ericsson EDACS Talkgroups

By David L. Wilson

Scanner manufacturers have spent a good deal of manual space explaining Motorola Type I trunk systems so that the scanner user can set up his scanner to understand such systems and scan the talkgroups of interest. Unfortunately, not only are Motorola Type II and Ericsson EDACS trunks systems only briefly described, the scanners themselves do not often indicate the most useful talkgroup designators (in the case of Motorola Type II) or even correctly identified designators (in the case of EDACS). For the casual listener, this information may not be of much interest; but for those interested in figuring out trunk systems, it is essential.

❖ Motorola Type II

Motorola Type II talk group numbers have mystified many scanner hobbyists for some time. Some may know they come from a set of twelve binary bits, of which the last four status bits indicate special purposes. The last bit before these in a Type II talk group is usually a 1, which is used to indicate talkgroup priority. The first three bits indicate which of the 7 blocks the talkgroup is in, for allocating that block as either Type I or Type II. But still, some mystery remains as to the rationale behind talkgroup assignments in each particular situation.

A scanner or scanning reference might show a Motorola Type II as 7D3 in hexadecimal or as 32048 in decimal. Some sources also would identify this talk group by its supposed Motorola designator 802003 (from 32048 divided by 16 plus 800000). This talkgroup is the first of a series of used talkgroups. But why did the developer start with 7D3?

Unfortunately, none of these designators give an indication of the thinking of the system designer. However, as will be seen in the following example, there is another number for this talkgroup that *does* show the thinking that led to this talkgroup assignment.

If starting with the four hexadecimal designator (example, 7D30):

1. Drop the last character (7D3)
2. Convert the hexadecimal to binary (011111010011)
3. Drop the last bit (01111101001)
4. Convert the binary to decimal (1001 – it just happens that in this particular example results in a decimal that only has 0's and 1's).

Steps 2 and 4 can be done using the MS-Windows calculator by choosing the base clicking on the left side to choose hexadecimal (Hex), decimal (Dec), or binary (Bin), then entering the number in that base; and finally clicking on the

left again to choose the desired new base.

Note that in the example, the result of 1001 is just 1 more than a thousand. The system designer decided to reserve the first 1000 talk groups for other purposes and started this set of active talk groups with 1001.

If one starts with the usual scanner decimal talkgroup designator instead (example, 32048), one does the following steps:

1. Divide by 16 and drop any remainder, as those are due to the final four status bits in the binary indicating a special purpose (2003)
2. Subtract 1 (2002)
3. Divide by 2 (1001 – the same answer we got when we converted 7D30 to decimal, so this is the same talk group).

Note that the first three possible talkgroups in a Type II system as displayed on a scanner are 16, 48, and 80, which now become 0, 1, and 2 – It now becomes evident these are the first three talkgroups in the system.

When one does the above, the first talk group in a cluster of active talkgroups is often found to be a number like 25, 26, 50, 51, 75, 76, 100, 101, etc. This is because the system developer divided up the talkgroups at the “nice” numbers of 25, 50, 75, 100 etc. to reserve space for other purposes or for expansion. Understanding this logic may aid one in deciphering the talkgroups of a Type II system.

❖ Ericsson EDACS

In the case of EDACS trunked systems, scanner manufacturers have generally allocated the EDACS AFS (Agency-Fleet-Subfleet) 11 bits as 4 agency bits (up to 16 agencies), 4 fleet bits (up to 16 fleets per agency), and 3 subfleet bits (up to 8 subfleets per fleet). This will be referred to below as AFS-4/4/3.

The problem is that systems may choose to allocate the 11 bits differently. Many systems allocated the 11 bits as 3 agency bits (up to 8 agencies), 4 fleet bits (up to 16 fleets per agency), and 4 subfleet bits (up to 16 subfleets per fleet). This will be referred to as AFS-3/4/4 in what follows. The impact of displaying as AFS 4/4/3 when the system is AFS-3/4/4 is that the AFS breakdown into agencies, fleets, and subfleets is incorrect and the logic of the designer of the system is no longer clear.

As an example, many EDACS systems on a scanner or in a scanning reference will indicate a busy talkgroup as 02-021. This is often the police or fire dispatcher. In AFS-4/4/3, this would indicate agency 02, fleet 02, and subfleet 1. Note that 4 bits, being 0 to 15, will always be

written as 2 decimal digits; and 3 bits, being 0 to 7, will always be written as 1 decimal digit. (Thus, for example, we wrote 02 instead of 2 for the agency number above, 02 instead of 2 for the fleet above, but 1 for the subfleet.) But then what happened to agency 01, fleet 01, and subfleet 1? We will soon discover.

Let us see what happens if we allocate the bits correctly as AFS-3/4/4.

1. First, break the AFS 4/4/3 designator into agency, fleet, and subfleet: 02-021 becomes 02-02-1
2. Now convert these to binary where 2 digits become 4 bits and 1 digit becomes 3 bits (use the MS Windows calculator if needed): 0010 0010 001
3. Now regroup the AFS-4/4/3 as AFS-3/4/4: 001 0001 0001
4. Convert the binary back to decimal (base 10) (again using the MS-Windows calculator if needed and using 1 decimal digit for 3 bits and 2 decimal digits for 4 bits): 1 01 01
5. Finally, as has been the tradition, place a dash after the agency and concatenate the fleet and subfleet: 1-0101

We have now discovered that our 02-021 is actually agency 1, fleet 1 and subfleet 1, not agency 02, fleet 02, as the 02-021 would lead us to think when it incorrectly grouped the bits between agency, fleet and subfleet.

Rewriting the talkgroup designators with the bits correctly allocated in AFS will often show the logic of the system's designer in setting up the various talkgroups in the system.

Finally, a quick look at information on the net may indicate that in some areas AFS-2/4/5, AFS-3/3/5, or AFS-3/5/3 are in use. It should be apparent how to modify Step 2 above to take care of these. If the agency, fleet and subfleet numbers seem strange for your system, it will be worthwhile to experiment to find the correct one to enable you to determine possible users of newly discovered talkgroups. An abundance of even numbered agency or fleet numbers is often an indication that the displayed AFS is not correct.

In conclusion, a little experimenting to determine the talkgroup number that the system designer used in designing a Motorola Type II system (or the correct agency-fleet-subfleet, in the case of an Ericsson EDACS system) will aid the listener in determining the use of the talkgroups that he hears.

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MT



REVIEW

NITELOGGER II

By Bob Grove W8JHD

One of the most popular accessories on the scanner scene is the Nitelogger, a time compressor for recording communications off the air. It was unavailable for a while during manufacturing upgrades, but now it's back as the Nitelogger II. So, just what makes this little device so useful?

Scanner enthusiasts know the frustration of having to wait long periods of time for activity on some frequencies; they can attach a tape recorder to the scanner's audio output jack, but when the recording is played back, the long periods of silence are still there – right up until the tape runs out.

News organizations and public safety communications centers as well have a need to record activity for later review or to archive for legal reasons.

Nitelogger II is not a tape recorder, but it's an automatic, sound-activated device which starts the recorder only when a transmission is heard, thus compressing hours of monitoring time on a single tape without the long delays between transmissions. Thus, unattended, the Nitelogger II will record a considerable period of monitoring for later review in a much shorter time.

The details

Nitelogger II has an impressively refined, professional look, and well it should. It is easy to use, flexible, reliable, and feature packed for every listening requirement. It comes with audio and activation cables for interconnection with the scanner and tape recorder, and includes an AC

wall adaptor as well. Designed for 12 volt power, it can also be battery-operated for mobile, portable or discreet installations.

Measuring only 4-1/2" x 3-1/4" x 2" and weighing less than a pound, Nitelogger II is a compact accessory for any location. Interface is provided by three jacks: Audio input (8 ohms nom.), audio output (600 ohms nom.), and control (switch for record activator).

Since plugging into a scanner's external speaker jack automatically disables the speaker, Nitelogger II has an internal speaker to provide audio monitoring during the recording session if desired; speaker volume level may be adjusted by a front-panel control.

Simple voice activators (VOX) often result in choppy recordings; Nitelogger II offers user adjustment of delay after sound stops from 1/4 second (250 mS) to 2.5 seconds, similar to the scan-resume delay found to be most effective on scanners. This provides a smoother recording session, avoiding the choppiness and "wow" from too-frequent motor start-ups.

The activator relay uses silver-nickel contacts to increase the lifetime of activations, typically 10 million. That should be enough for any recording session – and for years to come! The contacts can handle up to 2 amperes of current at 30 volts DC, well above normal tape recorder requirements.

Let's try it out

Connecting and using the Nitelogger II couldn't be quicker or easier. The molded plugs



are inserted into the scanner and tape recorder, the wall adaptor is plugged in, and the monitor volume is adjusted for comfort while a signal (like your local weather channel) is being received. A small screwdriver (not included) is used to adjust the front-panel input level as revealed by an illuminated LED; a second LED reports the activation of the tape recorder. That's it.

But we don't always want to be recording, so rather than having to unplug the device, a front-panel switch allows instant selection of disabling the recorder, operating the Nitelogger II, or returning control to the tape recorder so the tapes may be played.

All in all, a very useful device at an economical price. Nitelogger II is available from Grove Enterprises for \$49.95; call 800-438-8155, email order@grove-ent.com, or write 7540 Hwy 64 West, Brasstown, NC 28902.

NOTICE: It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.

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REVIEW

Zap Checker 270

By Bob Grove W8JHD

Radio frequency (RF) field strength meters have been around for the better part of a century, but more recently these have evolved from simple detectors to active circuitry. The growing presence of wireless systems has resulted in the extension of the frequency ranges of these useful devices well into the microwave spectrum.

❖ A little primer

So just what is a field strength meter, and how is it used? In its simplest form, it is nothing more than a diode connected to a meter; the diode rectifies the signal voltage being received from a nearby emitter, and the resulting current is used to deflect the meter. The closer the meter, or the stronger the RF field, the more the needle on the meter is deflected.

More sophisticated units use solid-state circuitry to amplify the signal, as well as utilizing tuned circuitry for wider frequency range, and even offer audible and visual alarms for signal presence or high levels of RF energy.

Uses for such a small, versatile instrument are considerable: Detection of hidden transmitters ("bugs"); finding wireless surveillance cameras in countermeasures assignments; screening electronic equipment including microwave ovens for RF leakage; locating sources of RF interference to receiving systems and wireless networks; adjusting transmitter and antenna systems for maximum output; notification of an unauthorized radiat-

ing device (CB, walkie-talkie, cell phone, etc.) in an RF-quiet zone, and more.

❖ Enter the ZAP 270

Several years ago, the Alan Broadband Company, a California entrepreneurial company, developed their initial entry into this field, the ZAP 180, still a very popular field-strength device. But climbing upper-frequency limits have required the availability of detection and measurement equipment with higher sensitivity and directivity; thus, the ZAP 270.

The model 270, as shown here, draws its operating power from two AA alkaline cells (included) with an operational lifetime exceeding 60 hours – That's efficient use of power. Its two-inch analog meter is boldly printed for easy reading and is calibrated in a simple 0-100 arbitrary scale for quick reference.

A red-green LED pair gives further indication of signal presence during dim-light or nighttime conditions. A thumbwheel sensitivity control allows quick adjustment of the meter for low background (green). As the instrument is swept over a suspect area, the meter advances and the green light extinguishes as the red comes on, indicating RF presence.

For unobtrusive operations, an internal vibrator alarm can be switched on, alerting the operator so he doesn't have to continually watch the instrument during the sweep. The vibration intensifies as the source is approached.

The contoured shape provides comfortable and secure grip, and the compact size – more like a pocket flashlight – makes the instrument easy to use and easy to store. Only 5 inches long and weighing a mere 5 ounces, the 270 is easy to pack anywhere.

❖ So, what's different?

So far, the model 270 sounds much like its basic brother, the 180; both offer 10 MHz to 4.5 GHz frequency coverage and high sensitivity (covert "bug" and cell phone detection at 20 feet or more). But this is where the similarity ends – the upscale 270 includes an external antenna option for directivity.

An optional log-periodic dipole array provides some directivity and a little forward gain in the 1.8-4.5 GHz range; the antenna itself is actually capable of performance through 6.4 GHz, limited only by the upper bandwidth of the 270. Alternatively, the user

may wish to provide his own SMA-connected antenna for any frequency range in the spectrum of the agile 270.

❖ Our field test

The ZAP 270 is a breeze to use. Operation is intuitive, with clear labeling and few controls. The meter is large enough to see and the imprinting is bold black and white; the LEDs are large and bright; and the thumbwheel on/off sensitivity control is ergonomically positioned for right- or left-handed users.

A LOG/MID/LINEAR switch permits the user to select meter response from logarithmic change of strength of 1000:1 amplitude ratio, to an intermediate range of the weakest 20 dB signals, to the sensitive linear mode for signals of a 3:1 ratio in strength.

A walk-through of our home with the 270 revealed a symphony of signals, from computers and wireless networking to TVs and cordless phones. Our microwave oven was a transmitter of its own, with clearly-detectable signals 20 or more feet away.

Other, more powerful signal sources like my two-meter ham transmitter and FRS transceiver really made the 270 dance, and from considerably greater distances.

Since the microwave operates in the same 2.4 GHz spectrum as our wireless computer network, we decided try the optional antenna – a miniature, planar-array of log-periodic dipole elements etched on a printed circuit board. It is affixed to the 270 by its SMA connector.

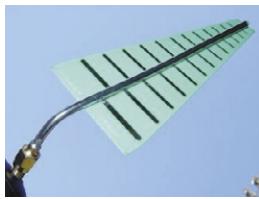
The side switch on the 270 was moved from the internal position to the SMA position and the microwave oven switched on. Sure enough, with the 270 adjusted to a threshold sensitivity (barely lighting the LED), I could move the hand-held radio direction finder around and it always favored the position of the oven. Without the antenna, the 270 was far more omni-directional.

❖ Does this replace the spectrum analyzer?

At first glance, it would seem that an agile field-strength meter like the ZAP 270 might be substituted for a far-more-expensive spectrum analyzer for certain applications like locating surreptitious transmitting devices.

While the field-strength meter does, indeed, respond to such devices, it is a broadband





in consumer appliances. This can be confusing to the user unfamiliar with such properties.

Spectrum analyzers, on the other hand, are frequency-specific; they display on their

device which also responds to anything in its frequency range, like computer microprocessors, power-line harmonics and digital circuitry

screen the discrete signal spikes from emitters throughout the spectrum, enabling their individual identification. Spectrum analyzers are also more sensitive, showing signal presence from many miles away, much like a radio receiver, which, in fact, they are.

But this is not to short-sell the field-strength meter. Properly applied as a screening device, they are effective RF-energy finders, and particularly models like the Alan Broadband "ZAP" series with their inherent high sensitivity, extremely wide frequency coverage, and simplicity of use.

The bottom line

With the limitations of any field-strength meter fully understood, the ZAP270 is sure to please. Its extraordinary wide frequency response, high sensitivity, flexibility, rugged construction, battery economy and ease of use make it a first-class choice in its field.

The ZAP 270 is available from Grove Enterprises for \$ 259.95; the 270 with the optional 1.8-6.4 GHz antenna is \$319.95.

The Versatile Eton E10

By Gayle Van Horn

The Eton E10 is a recent entry in Eton's new Elite series of portable digital radios. This versatile model covers AM, FM and shortwave in a lightweight compact radio, perfect for travel or office use.

The E10 receives all 14 international shortwave bands (shortwave tuning coverage from 1.711-29.999 MHz), AM broadcast band (520-1710 kHz), and the FM broadcast band. A built-in telescopic antenna is used for shortwave and FM, and an internal ferrite bar antenna is used for the AM broadcast band. A mini plug jack on the side of the radio facilitates connection of an external FM or long wire shortwave antenna.

The various tuning aids in the E10 include a direct keypad frequency entry, scroll wheel, and up-down tuning buttons. You can select fast or slow for manual tuning. The up-down buttons allow you to band scan, automatically stopping on the next station encountered. Shortwave stations can be tuned in 1-kHz or 5-kHz increments. Mediumwave tuning is selectable between 9kHz/10kHz.

The bandwidth button is used when listening to SW or AM stations, to minimize interference. When shortwave listening, the SW IF SET button can shift the intermediate frequency to help minimize interference. For extra "matching" of the antenna to the radio, the E10 includes an Antenna Trimmer Control knob to optimize the model's telescopic antenna when listening to shortwave.

An added feature is the ten pages of memory, each page holding 50 frequencies. This enables storing of 500 frequencies in memory for scanning. The factory presets a memory bank, which may be used or reset using a direct entry of the numeric keypad for your personal listening needs. I found the Memory Auto-Scan especially helpful when checking for preset favorite stations.

Frequencies are displayed in a large backlit LCD, while signal strength is indicated via a five-level graph bar. The radio's back stand proved helpful for

table top or "hand-held" listening. The interval speaker provided a rich audio tone with loud, crisp and good audio levels. A set of ear buds are included for private listening and stereo reception in the FM mode.

In recent testing and monitoring, I discovered an above average radio with a dynamic range for a low end portable. FM reception was exceptional, as well as medium wave reception from foreign station in the Caribbean and Mexico.

Shortwave reception among the international power-houses and tropical band stations proved impressive for this portable radio. Though not a "DX-machine," it proved impressive in monitoring stations with good to very good signal strengths at levels comparable to a lower-cost table top receiver. Band scans in the 41, 31, 25, 49, 19, 22 and 16 meter bands indicated better than average signal strengths for general program listening.

Other features of the E10 include a 12/24 built-in clock, which may be set for either format, and the snooze feature to wake you up to a preset station or the last one tuned. Other refinements found on the side of the radio include a DX-local switch, tone button, and FM/SW external antenna jack. The E10 operates from four rechargeable 1100 mAh Ni-MH AA batteries that may be charged inside the radio with the supplied AC wall charger.

For the FM, AM or shortwave listener

seeking an affordable portable digital radio, the new E10 is just what you're looking for. Whether for travel, the office, bedside or carry-along, this is a terrific radio. The complete product kit includes a protective case, wind-up antenna, owners manual, four AA batteries and product booklet.

The E10 is available for \$130.00 USD via the Eton website <http://www.etoncorp.com>. For additional information about the E10 or other Eton products, call 1-800-872-2228.



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Radio Shack Pro-2096

By Larry Van Horn, N5FPW

It is a debate as old as the scanning hobby itself. Who makes the best scanner? Which scanner is the best one in the marketplace? What scanner should I buy?

Get a group of 10 scanner hobbyists together in one room and you will probably get 10 different answers. A lot of that variance is due to the listening habits of the hobbyists themselves and the various radio systems available to monitor in each one's local area.

There is no "one size fits all," easy answer to the questions above. But there is one fairly universal constant we can point to: Over the last few years we have had more "receive capability" packed into our new scanners than at any other time in the history of the hobby. This new capability is due in large part to the technological advancements of the two major scanner manufacturers: Radio Shack (GRE) and Uniden.

Although having a scanner that can monitor a significant portion of the radio spectrum is a plus, if the scanner can't decode signals in those bands into usable audio for the listener, having that extended frequency coverage is useless. Fortunately for the radio hobbyist, these two manufacturers have pushed each other and the limits of technology in order to provide the radio community with some of the most advanced scanner products ever offered. When it comes to "receive capability" Uniden and Radio Shack rise to the top of the receiving market heap.

This month we look at one of the most recent of these new products: the Radio Shack Pro-2096.

❖ The Pro-2096: Top Features

The Pro-2096 has a lot of capability packed in its small package. In addition to scanning conventional frequencies programmed into the scanner, it can handle most of the major trunk protocols that the scanner user will encounter in the field, with one notable exception. The 2096 can track most of the Motorola trunk systems on-the-air today, including: Type I, II, III Hybrid, and APCO 25 phase 1 digital systems (including 3600 bps and 9600 bps control channel systems using the C4FM and CQPSK modulation schemes) and M/A-COMs EDACS systems. However, the 2096 cannot track any of the Johnson LTR trunk systems used by local businesses and a few public safety agencies.

Like its sibling the Pro-96, the military aircraft band can be opened up using Don Starr's WIN96 software at <http://www.starrsoft.com/software/Win96/>. While we didn't have a chance to check out the performance of the 2096 in the 225-400 MHz band, field reports from some Milair monitors at airshows indicate that the Pro-96 is not very sensitive in this band. Since the 2096 is based on the same RF configuration, we will probably see similar results with the 2096.

Unlike the first generation of trunk scanners (e.g., BC-895), the user can scan conventional frequencies and trunk systems, instead of just one or the other. The 2096 scanner will also decode conventional digital APCO 25 frequencies.

Some of the other major features of this scanner include six preprogrammed frequency ranges: Marine, CB, FRS/GMRS/MURS, Police/Fire, Civilian Aircraft, Amateur Radio, and one limit search (user configurable). Another nice feature is the ability to copy active frequencies found during frequency searches into a memory channel. Also, like many other recent scanner product releases, the 2096 has weather alert and SAME signal decoding capability.

The 2096 has two types of storage memory. Working memory (500 channels) is the memory that your scanner uses while you are programming, cloning, or actively listening. The other memory is the most-touted feature of the Pro-2096: the V-Scanner (Virtual Scanner). This feature allows you to edit, store, recall and use up to 11 full sets of

scanner memory profiles. With V-Scanner, it is possible to create separate scanner memory profiles for different areas you visit or for different ways that you use the scanner.

One final feature of note is the 2096 digital AGC (Automatic Gain Control). You may find that audio levels vary greatly among different users on digital systems. The Pro-2096 includes a digital AGC that can help compensate for these low audio levels when they occur. This function is selectable and will have no effect on analog transmissions.

❖ What's in the Box?

In addition to the Pro-2096 scanner, you will get a whip antenna, AC adapter, DC cable with fuse (cigarette-lighter adapter optional), two mobile mounting brackets (conventional mount with side knobs and DIN sleeve and 2 keys), mounting hardware, quick start guide, users guide, and preloaded data addendum.

❖ Overall Rating and Final Thoughts

There is a lot of scanner here for the money. Overall, I like the Pro-2096. I do have a few complaints that potential buyers should note. First, there's no LTR trunking capability. If you have a public safety agency or business that uses LTR trunking, you will have to conventionally scan that system. Second, there is no military air coverage (see text above). Third, unlike most of the Uniden trunk trackers, there is no built-in computer interface or software (see specifications below), and no flash updating of the scanner firmware. And, while the screen is nicely laid out, it is small and somewhat difficult to read. If you are visually impaired you will have trouble seeing this screen.

If you purchase the 2096 and use it for trunk tracking a Motorola 800 MHz analog trunk system, the FCC rebanding of the 800 MHz band may become an issue at some point. Once a local agency has been rebanded, the unit will no longer trunk track that system and the unit will have to be sent back to Radio Shack to update the firmware.

Looking past the issues above, I like the Pro-2096. It is an excellent scanner and worthy of a spot in your shack. The manual is one of the best I have seen, scanner performance is very good, and the unit is very easy to program and use.



MT Rating: Four Stars



MT First Look Rating (0-10 scale)	
Audio Quality.....	8
Audio Levels.....	8
Backlight/Display	6
Ease of Use	9
Feature Set	7
Keyboard/Button Layout	8
User Guide	9
Overall Reception.....	8
Sensitivity.....	8
Selectivity.....	8

Table One: Pro-2096 Specifications

Frequency Coverage

Frequency Range (MHz)	Programming/ Search Step Value
25.000-54.000 MHz	5 kHz
108.0000-136.9875 MHz	12.5 kHz
137.0000-174.0000 MHz	5, 6.25 or 7.5 kHz
216.0025-221.9975 MHz	5 kHz
222.0000-225.0000 MHz	5 kHz
406.0000-512.0000 MHz	6.25 kHz
806.0000-823.9875 MHz	6.25 kHz
849.0000-868.9875 MHz	6.25 kHz
894.0000-960.0000 MHz	6.25 kHz
1240.000-1300.000 MHz	6.25 kHz

Memory Organization

V-Scanners: 11	500-channel virtual scanners
Memory channels: 500	
Channel storage banks: 10	
Number of channels per channel storage bank: 50	
Talkgroup ID memories: 1500	
ID memory banks: 10	

Sub-banks per bank: 5
Number of memory IDs per sub-bank: 30

Sensitivity (20 dB S/N)

FM mode:	
25.0000-54.000 MHz	0.3 μ V
108.0000-136.9875 MHz	0.3 μ V
137.0000-174.0000 MHz	0.5 μ V
216.0000-225.0000 MHz	0.5 μ V
406.0000-512.0000 MHz	0.5 μ V
806.0000-960.0000 MHz	0.7 μ V
1240.0000-1300.0000 MHz	0.7 μ V

AM mode:

25.000-54.000 MHz	1 μ V
108.0000-136.9875 MHz	1 μ V
137.0000-174.0000 MHz	1.5 μ V
216.0000-225.0000 MHz	1.5 μ V
406.0000-512.0000 MHz	2 μ V
806.0000-960.0000 MHz	2 μ V
1240.0000-1300.0000 MHz	3 μ V

Selectivity

25.000-27.995 MHz in AM mode	
-6 dB \pm 5 kHz	
-50 dB \pm 6 kHz	
All other frequencies in AM and FM mode	
-6 dB \pm 8 kHz	
-50 dB \pm 14 kHz	

IF Rejection

380.8 MHz at 174 MHz	60 dB
21.4 MHz at 174 MHz	100 dB
Spurious Rejection at 174 MHz FM	40 dB

Scanning Speed and Delay

Scanning Rate: Up to 60 channels per second	
Search Rate: Up to 75 steps per second	
Conventional Channel Delay Time: 2 seconds	
Priority Sampling: 2 seconds	

Trunking Talkgroup Delay Time: User configurable

Intermediate Frequencies (IF)

1 st IF	380.7275 to 380.86875 MHz
2 nd IF	21.4 MHz
3 rd IF	455 kHz

Squelch Sensitivity

Threshold (FM and AM)	0.5 μ V
Tight (FM)	25 dB
Tight (AM)	20 dB

Miscellaneous Specs

Antenna Impedance:	50-Ohms
Antenna Jack:	BNC
Antenna (included):	Five section 26.5-inch telescopic antenna
Attenuators:	Channel and search band selectable, global attenuator
Audio Output Power (10% THD):	1.5 watts
Built-in Speaker:	3-inch (77 mm) 8 Ohm dynamic type
Computer Remote Control Jack:	1/8-inch mini jack (3.5 mm) used for cloning/programming. An optional Scanner/PC interface (20-289) can be purchased for \$24.99 on the Radio Shack website.
External Speaker Jack:	Yes
Headphone jack:	Yes
Mode Selectable:	Yes
Operating Temperature:	-4 to 140°F (-20 to 60°C)
Power Requirement:	13.8 volts, current drain 600 mA, center pin positive
Physical Dimensions (HWD):	21/4 x 71/4 x 55/16-inches (55 x 185 x 135 mm)
Reset:	Manual reset button on the rear deck of the scanner.
Weight (without cabinet and accessories):	27.7 oz. (790 g)
Note:	These specifications are typical and individual unit specs will vary.

Eton E1XM



Its selection of modes (AM, FM stereo, USB/LSB) assures total signal recovery, with functions all displayed on a giant 5.7 square inch LCD display. Up to 1700 memory locations with alphanumeric readout are accessible, with scanning capability as well.

High sensitivity, fine tuning (10 Hz steps), wide dynamic range, IF passband tuning, and selectable bandwidths (7.0, 4.0, 2.5 kHz) guarantee superior reception in crowded band conditions, with selectable-sideband synchronous detection improving interference rejection and fading signals.

Other advanced features include calibrated LCD S-meter, selectable AGC (fast/slow), dual-event programmable time set, separate bass and treble controls, stereo line-level input and output jacks, built-in antennas and external antenna jacks and more.

Measuring 13-1/8" W x 7" H x 2-1/2" D and weighing 4.2 lbs., the new Eton X1FM is powered by four D cells (not provided) or 120VAC wall adaptor (included).

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Worth Another Look The SDR-1000 with an “Approved” Sound

Recently, in a series of *MT* feature articles, the topic was Software Definable Radios (SDR), possibly the greatest change to radio technology in the past 100 years. One of the SDRs we looked at was FlexRadio Systems’ SDR-1000 transceiver. However, I may not have given it a fair shake.

As the saying goes, penny wise and pound foolish. During my initial look at the SDR-1000 I went against FlexRadio’s suggestions and attempted to use an on-motherboard sound card. What a waste of time! The results were confusing, ever changing and ultimately useless.

In the operation of the SDR-1000, the PC’s sound card is a key element. The SDR-1000’s performance – dynamic range for example, is greatly influenced by the sound card’s performance. FlexRadio clearly lists the sound cards they have tested, support, and therefore which allow optimal performance of the SDR-1000. But when I looked at the price of these cards the cheapest was around \$100. Being frugal, I decided to dig out my PC card inventory and try a few of my old sound cards. One, an inexpensive Aureal Vortex PCI sound card “worked” and I used it for running the SDR-1000 in the feature article.

I had a nagging worry that perhaps I was not giving the SDR-1000 a fair chance. After all, every time I spoke with the good people at FlexRadio they would courteously but “strongly suggest” that I use one of their approved sound cards. But my sound card seemed to work, especially compared to the miserable results that I had with the on-motherboard sound card.

I Get Feedback

After the third part of the SDR feature was published I began getting feedback from hams who had tried using unapproved sound cards

which worked. But they found a “huge performance difference” when they broke down and bought one of the sound cards on the FlexRadio list. My worry seemed to be well founded. But the cost of the approved sound cards, starting at around \$100 still did not fit in with my fiscally responsible philosophy ... call it what you may!

With these facts in the back of my mind, over the next few months I began to regularly watch the market price for FlexRadio’s approved sound cards. I entered them as “Favorite Searches” on eBay and checked the going price periodically. But even used, their prices were holding in \$60 + range.

Then recently, I received an email from a major on-line computer store advertising the Turtle Beach Santa Cruz sound card at \$42 including shipping. I immediately recognized this sound card as an approved FlexRadio card. Again, with my “fiscally responsible philosophy” I checked the prices of used Santa Cruz cards on eBay.

When I saw that they had fallen into the thirty-dollar range including shipping and handling, I knew it was time to get one. Watching the auctions for another week, I finally grabbed one at \$24 including shipping. Now a Flex Radio Systems “approved” sound card was very affordable! So, let’s see how to install and use the Turtle Beach Santa Cruz sound card with the SDR-1000. Then we’ll see its effect on SDR-1000’s operation.

Installation

First, remember to disable any on-board sound cards, usually done via the BIOS setup. Uninstall existing PCI sound card software drivers using Windows Control Panel. Or use the “uninstall” function in the old sound card’s program folder. Shut the PC down, remove the AC cord, and then remove the old sound card.

Next, install the Santa Cruz sound card in a PCI slot in your PC. Try to keep it away from the video card where it may pick up unwanted signals.

Using the included instruction manual and CD from Turtle Beach, the installation was quick and easy on my Pentium III, 1GHz PC, running Windows XP Professional.

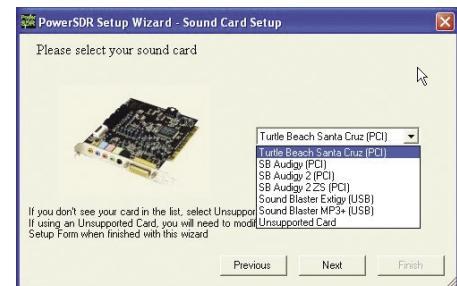


Figure 2 - Power SDR setup screen - With a Santa Cruz sound card it's a snap!

Remember, follow the few simple steps in the manual *exactly and in the exact order*. Your Santa Cruz card sound should now be operational and ready to use with the SDR-1000.

A Quick SDR-1000 Overview

The SDR-1000, Software Defined Radio (SDR) transceiver operates as a general coverage receiver in the range 11 kHz - 65 MHz. Modes of operation include: AM, Sync AM, USB, LSB, DSB, CW and FM. Filtering for DRM mode is included and will interface to the commercially available DRM software. See the November 2004 *MT* article SDR Part 1 for a detailed description of SDR-1000, including a block diagram.

The functions of an SDR-1000 are defined in software and it uses open source software code for programming the digital signal processing chip (DSP) and its control software. As such, a knowledgeable user can modify or add features/functions to the SDR-1000. Of course, these will be limited by the hardware.

SDR-1000 Hardware

A true Black Box, the SDR-1000 is housed in a black metal enclosure (see Figure 1), measuring 10" W x 8½" D x 4" H (25.4cm x 20.8cm x 10.2cm). It requires a 13.8 VDC power supply capable of providing 1.25 amps. The SDR-1000’s front panel is simplicity itself with just an on-off switch and a microphone jack. The back panel has an antenna connector, the parallel port and jacks for the input to the left and right channels of the sound card.

The SDR-1000 includes a transmitter that covers the 160 meter to 6 meter ham bands with a 1 watt peak envelope power (PEP) output. The price is \$875 plus shipping. A receiver-only version is also available from Flex Radio Systems.



Figure 1 - The black box SDR-1000

See <http://www.flex-radio.com> for pricing and details. Again, for details of the SDR-1000 operational circuitry see "Software Definable Radios Parts 1, 2 & 3" (also available on line under Reviews 2004 & 2005 at <http://www.monitoringtimes.com>).

❖ Power SDR

The software that runs the SDR-1000 and is provided on the Flex Radio site is called Power SDR. Flex Radio continues to produce new versions of the software in an effort to improve and expand the performance of the SDR-1000. Although version 2.0.0 was about to be released, it was not ready for this article deadline. So we used version 1.1.9. This Zip file is a little over 1.1 MB in size, which allows it to be stored on a floppy.

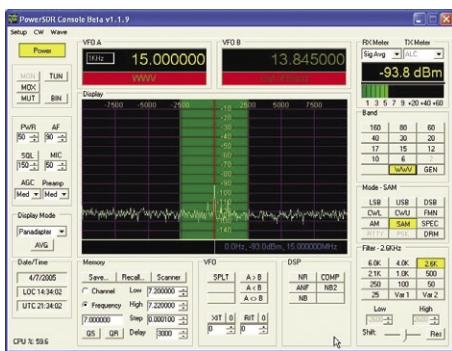


Figure 3 - Power SDR Version 1.1.9 main operating screen. Notice the "preamplifier" control on the left and the level of the background noise.

After unzipping and installing Power SDR it then guides the user through a set of set-up questions. Figure 2 shows exactly how easy it is, if you have an approved sound card such as the Turtle Beach Santa Cruz. Just highlight its name and hit "Next."

As seen in Figure 2, Flex Radio supports five other sound cards in addition to the Santa Cruz. For supported sound cards all audio parameters are pre-determined and require no user intervention. And best of all, the SDR-1000 works great the first time. No messing around with a number of interactive parameters and then wondering if the performance is optimal. It's all done for you by the Power SDR program.

❖ More Power SDR to You

Once you answer the four or so set-up questions, the main Power SDR screen is displayed, Figure 3. A number of important changes have been made in the 1.1.9 version as compared to

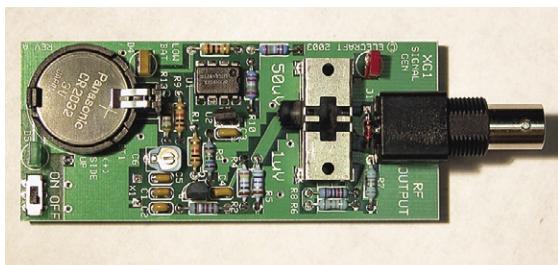


Figure 4 - Elecraft's XG-1 - The \$39(!)precision signal and level calibrator (after assembly)

the version used in our original review. One of the most impressive improvements is the automatic linking of three functions: IF (gain), Attenuator and Gain. The three have been combined into the "Preamplifier" setting, at the left side of the screen of Figure 3. This new feature makes operation much simpler, while maintaining optimum receiver performance. For most monitoring situations I found that the "Med" (medium) setting gave the best results.

❖ Frequency Calibration

The frequency calibration routine has been greatly simplified in version 1.1.9 requiring no math calculations. All it takes is a strong signal of known frequency, for example, WWV at 10.000 MHz. Clicking the frequency "Start" button found on the "Setup" menu's "General" tab screen, does it all in one quick action. These changes will be included in version 1.2.0.

❖ Exact Level Calibration

For the purists among us (read pedantic geeks) who put their faith in absolute measurements (in a relative world) the SDR-1000 can fit the bill. The SDR-1000 can directly provide "exact" signal and noise measurements. However, first it must be calibrated using a standardized signal generator. If you don't have a thousand dollar calibrated signal generator lying around the house, there is a \$39 alternative.

The XG-1 calibrator kit from Elecraft generates a fixed-frequency 7.040 MHz signal with "highly-accurate 1 microvolt and 50 microvolt output levels." This is a kit, so some dexterity with a soldering iron is required. However, the six page manual is very well written. The one page of step-by-step, detailed assembly takes between one to two hours to accomplish inserting and soldering the thirty components. See Figure 4 for the XG-1's fully assembled printed circuit board.

I would put the required electronic construction ability somewhere between intermediate and beginner. I didn't find any component particularly difficult to solder to the board. The manual includes simple ohmmeter testing procedures to verify correct assembly, so you don't need to turn the XG-1 on and blow it up to find that you have a problem. The XG-1's output is clean and constant in frequency and level.

The other pages of the manual describe the circuit and detailed procedures for using the XG-1 to test receiver sensitivity, S meter calibration and signal to noise measurements. At \$39 (plus shipping) this tiny (1.5" W by 3.5" L) XG-1 is quite a useful device for Hams or SWLers. Check out the XG-1 and their other products at the Elecraft website <http://www.electraft.com>. Tell them you saw it in *Monitoring Times*.

The XG-1 can be used to calibrate the SDR-1000's frequency and signal level to high degree of accuracy. This is simply done via two clicks in the Power SDR "Setup" menu's "General" tab screen.

❖ Sound (Card) Differences

The most obvious difference that the Santa Cruz sound card made to the SDR-1000's operation was in the background noise level. It was noticeably quieter, as can be seen in Figure 3's spectrum display, showing the noise floor down below -94 dBm. The Santa Cruz sound card also gives an improved signal to noise level, which was very obvious on weak signals. The signal in Figure 3 – a very, very weak WWV on 15 MHz – was completely "copyable." In my opinion, the Santa Cruz greatly improves the performance and operational stability of the SDR-1000 as compared to my non-approved and unsupported sound card.

❖ Always Improving

There is no question that the Turtle Beach Santa Cruz sound card made a big difference in the performance of the SDR-1000, just as Flex Radio indicated to me many months ago. To all the people that emailed me saying that would be so, all I can say is, you were right!

The 1.1.9 version is another positive factor in the SDR-1000's improved performance with its simpler gain and attenuator controls and other enhancements. Version 2.0.0 (estimated release date 10 April 05) will retain all of V1.1.9 features and add some. For starters, in version 2.0.0 the AGC has been tailored to produce cleaner audio and professional sound cards have been added to the approved auto set-up list.

Check Flex Radio Systems' website at <http://www.flex-radio.com> for the latest version of Power SDR and product information on the receive-only SDR-1000/ROE. Till next month. Keep sending me your input. I AM listening.

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What's NEW

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Portable Antenna Rotor

Ed Yeary clued us in to a nifty little antenna rotor. The unique antenna rotor from K1CRA runs on just four AA batteries and has the power to turn most small antennas 360°, making it perfect for motor homes, camping, contesting/roving, emergency communications vehicles and more!



The rotor comes supplied with a hand-held remote control and 10 meters of connecting wire, three-piece bottom mounting bracket and a top mast bracket.

The rotor is completely weatherproof and can be mounted permanently for use with TV, WiFi, VHF and UHF antennas. The price is \$49.95 from the K1CRA Radio Store, 5435 South Abbott Road, Armor Plaza, Orchard Park, NY 14217; call 716-648-2660 for information or visit <http://www.k1cra.com/>

Eton's Portable G4000A

The stylish new Eton/Grundig G4000A silver portable radio receives AM, FM, continuous Shortwave, and even SSB (Single Sideband) radio. Other features include: wide and narrow bandwidth filter controls, auto scan, direct keypad tuning, 40 programmable station presets, clock, and sleep



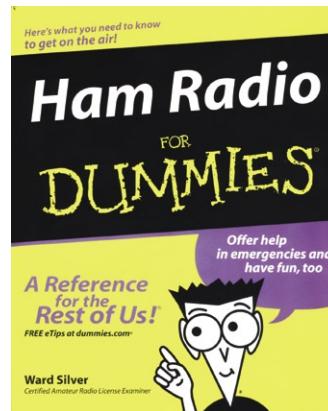
timer functions.

The G4000A ships with an owner's manual, operating instructions, carrying case, earphones and AC adaptor for North American use. Dimensions are 8" W x 4.8" H x 1.5" D. It weighs 1lbs. 5oz. and uses 6 AA batteries (not included) or AC adaptor (included).

The Eton G4000A is \$149.95 from Grove Enterprises (<http://www.grove-ent.com>; 1-800-438-8155) and other dealers. Look for a review in an upcoming *Monitoring Times*.

Ham Radio for Dummies

As I know only too well, there's a big difference between passing the test for an amateur radio license and actually getting on the air. And part of the reason is feeling like a dummy when it comes to being responsible for the actual operation of a station. *Ham Radio for Dummies* by Ward Silver (a columnist for *QST*) is a no-nonsense, plain English approach to getting new amateur radio operators on the air.



This is not a study guide for getting licensed, though it will show you how to do that. Part 1 is a quick introduction to amateur radio and its mission, the basic technology behind radio, and an overview of the ham community and its various organizations. Part 2 walks the reader through the process of getting one's license and what to expect when taking the test.

But then we get to the good stuff. Part 3 is loaded with practical information on the different modes and etiquette of operation

under various circumstances, such as casual contacts, contesting, net check-ins, or emergency communications. Part 4 tackles how to build a station that works and how to get it on the air.

In Silver's own words, "I am active in training volunteers for emergency communications and while many have a scanner or may use an FRS handheld, they are all interested in learning more about ham radio. The book was written both as the interested layman's introduction to ham radio and as a desktop reference for the newly-licensed."

Naturally, the book is loaded with references and resources for additional information. But clearly the book's primary intent is to help new amateur radio operators develop the confidence to get on the air with good operating skills and equipment.

The 380-page *Ham Radio for Dummies* is \$21.99 from <http://www.dummies.com> (where you can also download a sample chapter) or check your local book store for ISBN 0-7645-5987-7 by Wiley Publications.

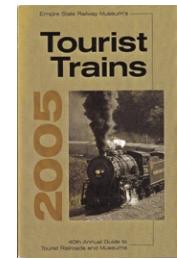
— Rachel Baughn

Tourist Trains

Few sights and sounds are as evocative as an old steam locomotive. It is this common experience that drives collectors, museums and even tourist railroads to continue their pursuit of a fading era. Scanner enthusiasts frequently tune in on communications between the terminals and the trains.

The Empire State Railway Museum has released their latest (2005) *Annual Guide to Tourist Railroads and Museums*, a photo-punctuated directory of more than 500 railroad attractions across the U.S. and Canada. Listings include locations, descriptions, schedules, admissions, and a brief inventory of their locomotives and rolling stock. Several pages of guest coupons are also included.

You can order *Tourist Trains*



2005 for \$17.95 from Kalmbach Publishing Co. by phone at (800) 533-6644 (262-796-8776 Ext. 421 outside the US and Canada) M-F 8:30-5:00 Central Time, via the website at <http://store.kalmbach.com>, or write for a catalog to Kalmbach Publishing Co., 21027 Crossroads Circle, P.O. Box 1612, Waukesha, WI 53187-1612.

— Bob Grove

ARRL Repeater Directory

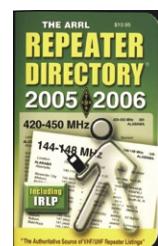
If you plan on traveling this summer, a handy pocket guide to carry with you is the *ARRL Repeater Directory*, newly updated for 2005-2006. This 34th edition has been completely revised, based on information from frequency coordinators throughout the US and Canada.

The pocket-sized book includes exhaustive listings of 19,828 repeaters and all related information pertaining to the system location, frequency(ies), callsign, sponsor, who may access the system and how. Background chapters cover general operating guidelines, band plans, and a list of frequency coordinators.

Although packet and foreign listings are no longer listed in the book, repeaters for Amateur Television (ATV) use and Internet Radio Linking Project (IRLP) nodes are now included. The digital packet listings have been moved to the Tucson Amateur Packet Radio Corporation (TAPR) website and foreign listings can be found at the Amateur Radio Relay League (ARRL) website and elsewhere.

The *ARRL Repeater Directory* is available for \$19.95 from the ARRL, 225 Main Street, Newington, CT 06111-1494; <http://www.arrl.org> or call 1-888-277-5289.

— Rachel Baughn



Send new product announcements to Monitoring Times or email editor@monitoringtimes.com

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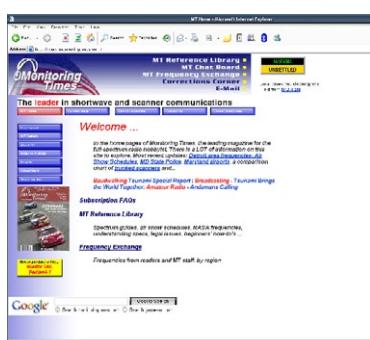
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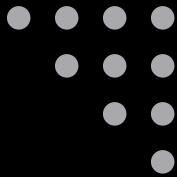
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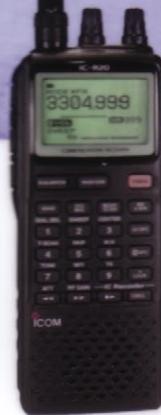
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